

Das Tier hat, weil ich es zu früh in Spiritus legte, verkrüppelte Flügel. Diese Varietät, die ich *flavissima* n. var. nenne, ist ganz gelb, und nur die 2 ersten Fühlerglieder sind schwarz, das 3. Glied ist bräunlich. Wangenanhang zur Länge des 2. Fühlergliedes wie 3.5 : 6. Vielleicht ist es eine gute Art. 3) *pseudoleprieuri* n. sp. ♀

— Flügel rauchig, zur Basis braun, Geäder braunschwarz. Beine weiss; Hüften, Trochanteren und Schenkel bis auf die Kniee, die Hintertarsen und die Apicalhälfte der Hintertibien mehr oder weniger dunkel braunschwarz. Färbung braunschwarz, manchmal mit blauem Metallschimmer, der Kopf und auch gewöhnlich die Fühler schwarz. Hier und da, besonders an den Tergiten, Sterniten und Pleuren schimmert es bleich durch, ein Umstand der darauf hinzuweisen scheint, dass der Körper gelb werden kann, sodass es möglich ist, dass diese Art das Männchen zur var. *flavissima* n. var. der vorigen Art ist, besonders da beide nur etwa 100m voneinander entfernt gefangen wurden. Geäder oft unregelmässig, die 3. Cubitalzelle um wenig kürzer als die zweite. Der Kopf hinter den Augen geradlinig verschmälert; Breite zur Länge des Scheitels wie 12 : 9. Tergite poliert und unbehaart. Wangenanhang 0.04 mm. Sonst wie vorige Art. Rechte Penishälfte siehe Fig. 14. Länge 6 mm. Ein Männchen mit einer Acarine hinter dem 2. Sternit. 2.XII.1928, 12 Männchen. Espirito Santo, Sta. Thereza, O. Conde leg. .

4) *nigerrima* n. sp. ♂

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The biology of the fungus-growing ants. Part IV. Additional new forms.  
Part. V. The Attini of Bolivia.

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(With 21 figures)

Part IV. Additional new forms

Many of the new species and subspecies here described were discovered in a remarkable collection made by Dr. William M. Mann in Bolivia and loaned to me for study by the U. S. National Museum. Other new forms, taken by myself in Trinidad, Venezuela and British Guiana, were not described in Part I. Miscellaneous Attini from Cos-

ta Rica, Canal Zone, Brazil, and Antigua, B. W. I., are also included.<sup>1</sup> The drawings were made by Miss Helen Wilson.

Dr. Mann's collection is noteworthy for containing a large proportion of new *Apterostigmas* and an aberrant *Cyphomyrmex*, so different from the described forms in the entire absence of thoracic tubercles, the telescoped pedicel, and in other ways, as to constitute a new subgenus, *Cyphomannia*. His collection contains so many new forms and is so much larger than any previously made in Bolivia as to justify preparing a list of the Attini now known from that country (Part V).

*Mycocepurus bolivianus*, sp. nov. (Fig. 8)

Worker. — Length 1.7-1.9 mm., of thorax (including epinotum) 0.8 mm. Head in front view nearly square, excluding mandibles, slightly shorter from anterior clypeal margin to occipital impression than wide in front of eyes, occipital corners bearing single spines which are concave in front, convex behind, medial frontal impression carried to occiput and bounded posteriorly by short, vermiculate carinae of variable height, frontal carinae distinct only to a level with the eyes, then carried to occiput as indistinct carinae, frontal lobes short, convex laterally, anterior clypeal margin straight; antennal scapes extending to occipital tubercles; mandibles 5-toothed. Thorax above with two medial upright spines (pronotal), followed postero-laterally by two larger spines which are directed anteriorly and are the largest thoracic spines, these in turn followed by two pairs of which the most anterior is the larger; the 8 spines thus formed inclose a transversely ellipsoidal area on the highest part of the thorax

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1) Ants as the die or are mounted for study are usually more or less "cramped" or contorted from their normal shape. Many of those which have been preserved in alcohol or other fluids have the posterior gastric segments distended by gases of decomposition in the digestive tract. The contortion and distention renders measurements of the total length difficult and much confusion has arisen as to the exact lengths of ants. In this paper a new measurement has been added which is much more easily obtained than the total length. This is the length of the thorax, including the epinotum (propodeum of Hymenopterists in general) in a straight line from the anterior pronotal margin to the posteroventral angle of the epinotum, Fig. 17. It is a rigid structure which is not affected by the processes mentioned above. Another measurement added in *Apterostigma* is the tangential length of the femur which Emery had used in describing several species.

that bears a feeble lunate ridge, in the middle of which are found a pair of low tubercles of variable height; prothorax at the sides below and in front of the second pair of spines with a denticle; meso-epinotal region with a pair of tubercles borne on short carinae of which the posterior is much the larger, seen from above the tubercles enclose a square; basal surface of epinotum anteriorly with a pair of small tubercles, posteriorly with large, backwardly curved, acute spines. Petiole from above with four tubercles at the angles of a square; from above  $1/2$  as wide as the postpetiole. Postpetiole from above  $1 \frac{1}{3}$  times broader than long, medially with a deep impression bounded laterally by carinae, posterior margin projecting in a pair of gibbosities with a diastema between. Gaster strongly carinate. Legs moderately long and slender.

Opaque, mandibles striate, body finely reticulate-punctate, head coarsely reticulate-vermiculate, gaster less coarsely vermiculate.

Pilosity sparse, chiefly of reclinate short, stout hairs on gaster, and more upright finer hairs on head and appendages.

Ferruginous, head and thorax darker than rest of body.

Described from 18 workers taken by Dr. W. M. Mann at Rurrenabaque, Beni, Bolivia in October, 1921.

This species differs from *M. smithi* Forel chiefly in lacking the pre-occipital lateral tubercles, in having the second pair of thoracic spines directed anteriorly, the spines in the meso-epinotal region less massive, the epinotal spines more curved and less upright, the postpetiole less angulate, and in darker color. From the illustration of *M. reconditus* Borgmeier it differs in proportions of thoracic and petiolar spines as well as in smaller size. *M. obsoletus* Emery is probably another related species but is stated to lack the lateral denticle of the prothorax.

*Mycocepurus manni*, sp. nov. (Figs. 1-2)

Female. — Length 3 mm., of thorax (including epinotum) 1.16 mm. Head as long from anterior clypeal margin to mid-occipital impression as wide in front of eyes, occipital margin converging slightly from angles to medial impression, occipital angles with a small tubercle, anterior clypeal margin straight, eyes large, convex, situated in middle of head, lateral margin of frontal lobes convex, frontal carinae hardly longer than lobes and not continued to occipital angles by sculpturing, mandibles with gently convex outer margin, 5-toothed, the apical tooth being much the largest and acute, antennal scapes

extending barely past the occipital tubercle. Pronotum on each side with a single coarse tubercle which is upwardly directed; mesonotum plane with evenly rounded margins, posterior margin bidentate; epinotum with strong, acute teeth 0.15 mm. long. Petiole with long, sub-cylindrical node which is slightly convex ventrally and ends anteriorly in an angularity representing a feeble tooth, node above with two pairs of teeth, anterior pair upright, the posterior pair deflected almost horizontally backwards, seen from above the four teeth are at corners of a transverse rectangle. Postpetiole from above twice as broad as long with sides produced posteriorly as rounded, acute angles, median impression shallow, median emargination feeble, and posterior gibbositities low. Gaster moderately carinate on the sides of the first segment, the carinae gradually disappearing along the posterior  $1/4$ . Wings infuscated.

Mandibles striate, head coarsely reticulate-vermiculate, mesonotum longitudinally vermiculate, gaster irregularly vermiculate, becoming vermiculate-reticulate anteriorly.

Pilosity of scanty upright and short hairs.

Dark ferruginous, antennal scapes paler and contrasting with head, legs also paler.

Holotype: one alate female taken by Dr. W. M. Mann at San Gregorio, Bolivia, October 1921.

This female is much smaller than *goeldii* Forel or *ogloblini* Santschi and somewhat smaller than *reconditus* Borgmeier. It has smaller occipital tubercles than *smithi* ssp. *trinidadensis* Weber, lacks one of the pairs of pronotal tubercles, has a broader postpetiole and is in other ways different. It would probably be of about the same size as the unknown female of *M. bolivianus*, sp. nov. but the small size of the occipital tubercle suggests that they are not conspecific.

*Myrmicocrypta tuberculata*, sp. nov. (Fig. 9)

Worker. — Length 2.5-2.6 mm., of thorax (including epinotum) 1.1 mm. Head, excluding mandibles,  $1 \frac{1}{3}$  times longer than wide, occipital margin rounded with strong tubercles and a slight median emargination, postero-ventral angles of head drawn out on each side into an angulate collar or neck; sides slightly convex, converging anteriorly from the occiput, eyes strongly convex, situated well back of the mid-line and the frontal lobes; anterior clypeal margin evenly convex, posterior margin raised in front of antennal insertions as two blunt teeth; frontal lobes very small, reflexed, carinae

extend clearly to a level back of eyes; mandibles with outer margin convex and 7 irregular teeth; antennal scapes surpassing occipital corners by fully  $1/3$  their length, funicular joints longer than broad. Thorax very coarsely tuberculate, the pronotum with a medial and a larger lateral pair, the mesonotum with three pairs of which the most anterior is the most massive, the declivous surface with a feeble median and a much longer, acute posterior pair; basal surface of epinotum with a high, angular lamina on each side terminating in slender, acute spines. Petiole pedunculate, with a high, right-angled node above, joining the peduncle at an obtuse angle, and a large ventro-median tooth below which is continued backwards as an irregular carina. Postpetiole from above slightly over twice as broad as petiole and about  $1 \frac{2}{5}$  times broader than long, trapezoidal, seen from above, with rounded anterior and angular posterior corners, posterior margin emarginate, dorsal surface with a median, longitudinal impression. Gaster long-ovate, somewhat flattened dorsally and with an antero-dorsal impression. Legs long and slender.

Opaque, granulose, mandibles densely striate-punctate; gaster sub-lucid with large, shallow punctations and anterior striae.

Pilosity of moderately abundant squamate hairs, most abundant on tubercles, with narrower hairs and an appressed pubescence on appendages.

Fuscous, appendages a dilute, dull brown.

Described from seven workers taken by Dr. W. M. Mann at Ixiamas, Bolivia, December 1921.

This species is distinct in its coarsely tuberculate head and gaster. It resembles *M. spinosa* Weber of British Guiana in general habitus but differs chiefly in having much more pronounced lateral pronotal tubercles, in having the other tubercles of thorax lower, and in possessing the prominent ventromedian tooth and carina on the petiole.

*Myrmicocrypta longinoda*, sp. nov.

Worker. — Length 1.9-2.1 mm., of thorax (including epinotum) 0.72 mm. Head, excluding mandibles,  $1 \frac{1}{4}$  times longer than wide; occipital margin medially feebly impressed, corners rounded; inferior angles of occiput drawn out on each side of pronotum into strong paired tubercles; sides of head gently convex; anterior clypeal margin evenly convex, posterior margin in front of antennal insertions produced as a slight

tubercle; frontal lobes moderately developed with convex outer margins, reflexed; frontal carinae rudimentary; antennal scapes exceeding occiput by a distance equal to about twice their distal diameters; joints 2-9 of funiculus not clearly longer than broad. Thoracic tubercles reduced; medial pronotal pair very feeble, lateral pair larger and distinct, inferior pair of humeri distinct and still larger; anterior mesonotal pair reduced to low gibbosities covered with squamate hairs, medial pair more distinct but less massive, posterior pair distinct and acutely pointed; declivous surface of mesonotum raised in a gibbosity bearing one, with in some a rudimentary second, tubercle on each side; basal surface of epinotum with backwardly diverging carinae on each side terminating anteriorly in tubercle of variable development, posteriorly in a small, acute spine. Petiole pedunculate, the node angular above, the ventral surface feebly convex medially and anteriorly with a long, acute tooth. Postpetiole from above twice as broad as the petiole, very slightly longer than broad, sides straight, converging anteriorly to rounded corners, medially and towards each side emarginate. Gaster long-ovate, very slightly flattened dorsally. Legs long and slender.

Opaque, granulose, mandibles densely punctate, gaster coarsely and shallowly punctate.

Pilosity of moderately abundant squamate hairs on head and fewer on thorax and abdomen, narrow-squamate hairs on antennal scapes and legs, and a short, appressed pubescence on funiculi and tarsi.

Brownish yellow.

Described from a dozen workers taken by Dr. W. M. Mann at União, Rio Madeira, Brazil.

This species is characterized chiefly by the long postpetiole. That it cannot be the worker of *collaris* Emery, *corniculata* Emery, *rudiscapus* Emery, known only by the female, is indicated by its small size as well as the differences in the proportions of the petiole and postpetiole.

*Myrmicocrypta occipitalis*, sp. nov.

Worker. — Length 2.3-2.4 mm., of thorax (including epinotum) 0.93-0.97 mm. Head, excluding mandibles, about  $1 \frac{1}{7}$  times longer than broad, occipital margin transverse, medially with paired tubercles, posterior-ventral angles of head drawn out on each side in two tubercles; occipital corners

rounded with a slight inferior tubercle; sides convex, anterior clypeal margin evenly convex, eyes small, situated posterior to mid-line of head at a level above the frontal lobes; frontal lobes feeble, slightly deflected, carinae short, continued backwards as indistinct ridges enclosing a circular, depressed area; antennal scapes surpassing occipital corners by a distance equal to twice their distal diameters, funicular joints longer than broad; mandibles narrow, with sinuate outer margin; anterior paired medial tubercles of pronotum distinct, lateral pronotal tubercle longer and projecting horizontally at sides, three pairs of mesonotal tubercles distinct, the medial pair much the largest and with a massive base; declivous surface of mesonotum with paired acute tubercles on each side; basal surface of epinotum carinate on each side, produced anteriorly as a small tubercle, posteriorly as the moderately developed epinotal spines which are slender and acute. Petiole distinctly pedunculate with triangulate node, viewed in profile, ventrum without tooth but produced in middle as a slight convexity. Postpetiole slightly over twice as broad as petiole, distinctly broader than long, with sides, seen from above, rounded anteriorly, angulate posteriorly, posterior dorsal margin emarginate medially. Gaster long-ovate. Legs long and slender.

Opaque, finely granulose, tubercles of head connected by irregular ridges, mandibles striate-punctate, gaster sublucid with large, shallow punctations.

Pilosity of moderately abundant squamate hairs which become narrow-squamate on scape and legs, coarse, short hairs on tarsi, and an appressed pubescence on funicular joints.

Brownish-yellow.

Male. — Length 3.7 mm., of thorax (including epinotum) 1.57 mm. Head, excluding eyes, triangular, occipital margin convex, produced back of each posterior ocellus as an acute tubercle, occipital angles acute, anterior clypeal margin evenly convex, frontal lobes small vertical; mandibles trigonal with slightly convex outer margin and 7-8 distinct teeth; second and third funicular joints taken together longer than antennal scapes by a distance nearly equal to their diameter. Pronotum on each side with a pair of tubercles or small spines of which the inferior is the more acute and higher though less massive. Epinotal spines long, very slender and acute, curved backwards towards apices. Petiole pedunculate, without ventro-

median tooth, node rounded dorsally. Postpetiole  $1 \frac{4}{5}$  times broader than petiole and, excluding a short peduncle, about  $1 \frac{4}{5}$  times broader than long, the sides evenly convex anteriorly, shallowly emarginate posteriorly at each side and in the middle. Gaster somewhat flattened dorsally. Legs long and slender.

Opaque and finely granulose on head and thorax except for iridescences near sculpturing, rest of body, including mandibles, finely punctate.

Pilosity confined to sparse, simple hairs which are recurved on sculpturing, and a fine appressed pubescence on appendages.

Brown, appendages paler, mandibles yellowish brown. Wings iridescent, infuscated.

Described from 8 workers and 4 males taken by Dr. W. M. Mann at Tumupasa, Bolivia, December 1921.

It is very improbable that this species could belong to *collaris* Emery, *corniculata* Emery, or *rudiscapus* Emery of Peru and Bolivia, which are known only from the female, because of the proportions of the pedicel and because the size of the unknown female is probable distinctly smaller than those above; in general habitus it resembles *M. guianensis* Weber of British Guiana, differing chiefly in the considerable development of tubercles on the occipital region, and in the higher tubercles of the thorax.

*Myrmicocrypta boliviana*, sp. nov.

Worker. — Length 2.2 mm., of thorax (including epinotum) 0.82 mm. Head, excluding mandibles, nearly  $1 \frac{1}{4}$  times longer than broad, occipital margin straight except for distinct median emargination, occipital corners evenly rounded, lacking tubercles, postero-ventral angles of head produced on each side as a tubercle; sides convex, eyes of moderate size situated distinctly back of mid-line of head and posterior to frontal lobes; anterior clypeal margin evenly convex, frontal lobes of moderate size, reflected with convex outer margins, frontal carinae vestigial; mandibles with feebly sinuate outer margin and 6-7 irregular teeth; antennal scapes exceeding occipital angles by a distance equal to about twice their distal diameter; joints 2-9 of funiculus about as broad as long. Pronotum lacking distinct tubercles, the site of the usual tubercles being indicated by roughenings and squamate hairs; only the posterior pair of the mesonotal tubercles at all distinct and these low; declivous surface of mesonotum with a



single pair of tubercles — the usual anterior pair being represented each by a single squamate hair; basal and declivous surfaces of epinotum bordered on each side by carinae, epinotal spines feeble but acute. Petiole distinctly pedunculate, lacking a ventro-medial tooth but with a slight ventral convexity in middle, the node rounded above. Postpetiole twice as broad as petiole and  $1 \frac{1}{6}$  times broader than long, the sides convex, the posterior margin emarginate in middle. Gaster long-ovate. Legs long and slender.

Opaque, granulose, mandibles finely striate-punctate.

Pilosity of moderately abundant squamate hairs which become narrow-squamate on the appendages, the latter bearing a fine, appressed pubescence.

Yellowish-brown.

Described from two workers taken by Dr. W. M. Mann at Rurrenabaque, Beni, Bolivia, October 1921.

It is improbable that this species can be the same as *collaris*, *corniculata*, or *rudiscapus* for the same reasons as those given under *occipitalis* sp. nov. This species differs from the latter chiefly in having broader antennal joints, much reduced tuberculations of the head and thorax, and in somewhat darker color. It is closest to *M. guianensis* Weber from the far interior of British Guiana but differs chiefly in having larger frontal lobes, more feeble tubercles on declivous surface of mesonotum, shorter epinotal spines, and narrow postpetiole.

*Apterostigma gibbum*, sp. nov. (Fig. 18)

Worker. — Length 3.1-3.2 mm., of thorax (including epinotum) 1.4 mm., of hind femur 1.3 mm. Head, excluding mandibles, 1.4 as long as broad back of eyes, occipital margin distinctly impressed medially, occipital corners rounded-angulate; neck short but distinct, with transverse margin; sides of head converging anteriorly, impressed at eyes; eyes moderately convex; anterior clypeal margin strongly convex; mandibles trigonal with very feebly sinuate outer margins and moderately coarse teeth; frontal carinae well-developed for *Apterostigma*, extending nearly to occipital corners; frontal lobes thick, convex on outer margin; antennal scapes thick, incrassate distally, exceeding posterior margin of head; funicular joints 2-7 appreciably broader than long. Anterior pronotal margin with a pair of large, reflected, widely separated lobes, sides above coxae raised in a distinct gibbosity; promesonotal median ridges from above thick, irregular, and low

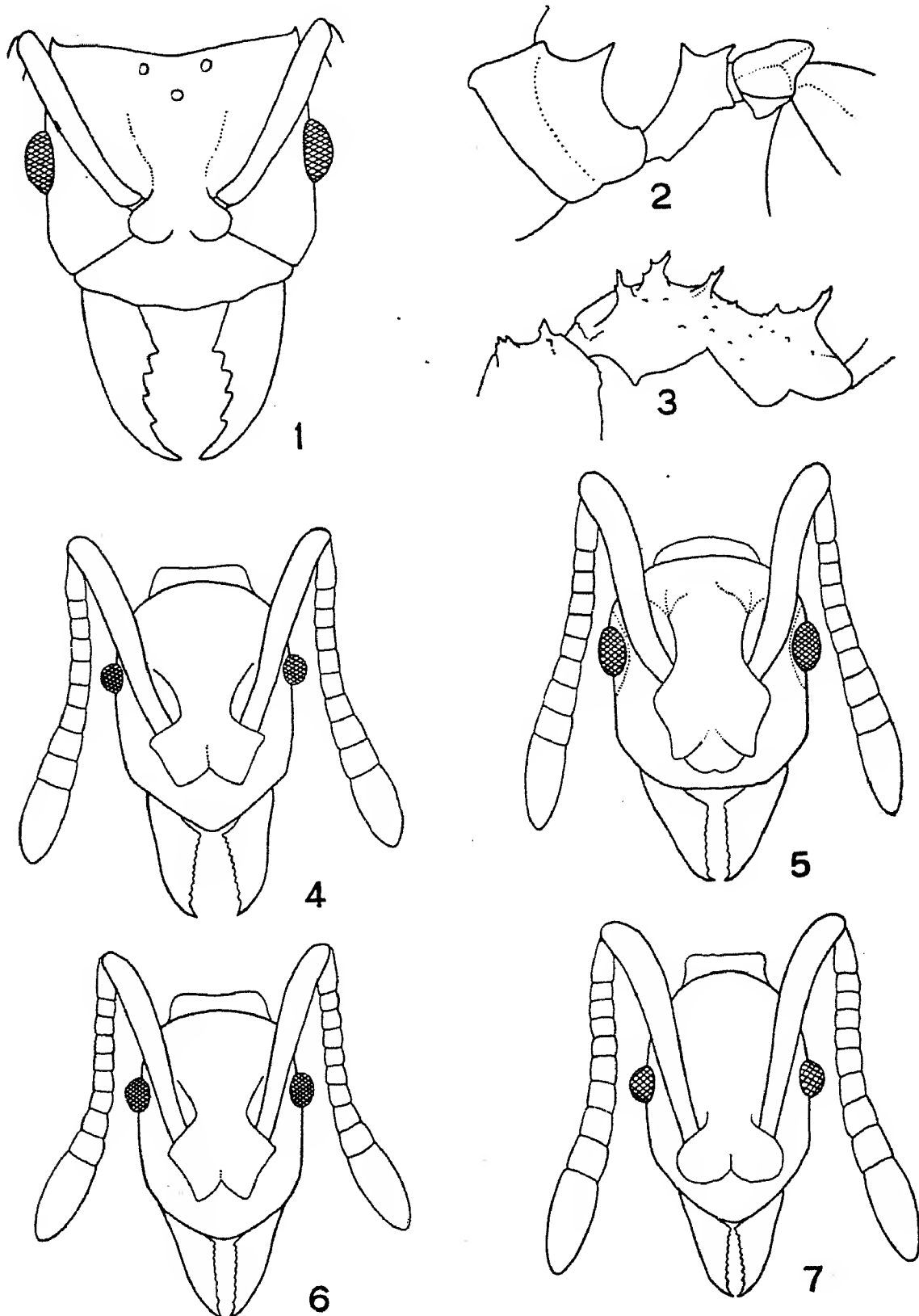


Fig. 1. *Mycocepurus manni* n. sp., head of female. — Fig. 2. *Idem*, female, epinotum and pedicel. — Fig. 3. *Trachymyrmex echinus* n. sp., worker. — Fig. 4. *Apterostigma collar* Em. *angulatum* n. ssp., head of worker. — Fig. 5. *A. billi* n. sp., worker. — Fig. 6. *A. collar* Em. *dubium* n. ssp., worker. — Fig. 7. *A. robustum* Em. *tic* n. ssp., worker. (Helen Wilson del.).

except above meso-epinotal declivity where they are sharply produced as high, convex lobes; meso-epinotal impression in

profile broadly and smoothly concave; epinotum from above with paired ridges which diverge posteriorly, in profile the basal surface is straight and forming a rounded angle with the declivous surface, which is concave. Petiole short, in profile about  $1 \frac{1}{4}$  longer than high, the pedicel thick, the node small and rounded-angulate, from above deeply concave with carinate margins, ventral surface plane with a right-angled tooth at the anterior margin. Postpetiole massive, from above much wider posteriorly than anteriorly and with convex sides, distinctly wider than long, broadly impressed posteriorly. Gaster moderately carinate at sides. Legs moderately long and slender.

Opaque, mandibles finely striate.

Moderately densely pilose, the hairs reclinate to appressed, the pubescence moderately abundant and obscuring the integument.

Ferruginous.

**Female.** — Length 3.5 mm., of thorax (including epinotum) 1.6 mm., of hind femur 1.4 mm. Antennal scape exceeding occipital margin by its distal diameter. Anterior pronotal margin with the widely separated and high lobes as in the worker. Epinotum in profile with a broad and rounded angle between basal and declivous surfaces. Petiole in profile about 1.4 longer than high, the anterior declivous surface of dorsum rising smoothly; ventral surface plane and with a distinct anterior tooth as in the worker. Gaster moderately carinate on sides. Fore wing 3.9 mm. long. Rest as in worker.

**Male.** — Length 2.9-3 mm., of thorax (including epinotum) 1.25 mm., of hind femur 1.2 mm. Head with a short but distinct neck which is markedly expanded at posterior margin; frontal lobes subvertical, thick with rounded margins; anterior clypeal margin convex, strongly produced as a lobe covering base of mandibles; mandibles trigonal, edentate; antennal scapes clavate, slightly shorter than funicular joints 1 and 2 taken together. 2nd funicular joint 0.8 times as long as 3-4 taken together. Anterior pronotal margin raised in form of two distinct rounded ridges which diverge outwardly and anteriorly from the level margin. Sides of thorax in front lack the distinct gibbosities of the female and worker but are slightly inflated. Epinotum in profile with an acute tooth between the basal and declivous surfaces. Postpetiole from

above so strongly emarginate on posterior margin as to appear bituberculate. Gaster sharply carinate on sides.

Head opaque, finely shagreened; remainder of body sublucid, microscopically and shallowly vermiculate with coarser setigerous tubercles.

Pilosity of moderately abundant reclinate hairs and sparse pubescence which is confined largely to appendages.

Head dark brown; neck and remainder of body yellowish brown.

Described from six workers and one alate female, and two males taken in March, 1922 by Dr. W. M. Mann at C. Esperanza, Beni, Bolivia.

This striking species is readily distinguished by its strongly developed frontal carinae, the gibbosities above the procoxae on the thorax and by the high, lobate ridges of the declivous surface of the mesonotum. It is near *A. ierense* Weber of Trinidad but differs in larger size, paler color, more strongly developed frontal carinae, sharper and higher gibbosities on sides of thorax above the procoxae, and in higher lobes on mesonotum. From *A. wasmanni* Forel of Brazil it differs in smaller size, paler color, and proportions of thoracic ridges. *Wasmanni* lacks the distinctive lateral gibbosities on the sides of the thorax.

*Apterostigma billi*, sp. nov. (Fig. 5, 17)

Worker. — Length 4.2-4.6 mm., of thorax (including epinotum) 1.9-2.0 mm., of hind femur 1.85 mm. Frontal lobes thick, uneven, convex laterally except for anterior impression, postero-medially impressed on dorsum; frontal carinae distinct, continuing backwards to occiput; between carinae the frons concave except for short, anteriorly divergent ridges; clypeus truncate, not completely covering bases of mandibles; neck distinct, above at each side with an impression. Antennal scapes moderately incrassate, exceeding occiput by over  $1/3$  their length. Anterior pronotal margin produced as a pair of tubercles; thoracic sculpturing coarse, with well-developed paired longitudinal ridges, in profile the ridges on declivous surface of metanotum appear triangular; basal surface of epinotum with paired ridges, in profile rounding smoothly into declivous surface. Petiole antero-ventrally with a distinct tooth, node rounded on top, distinctly lower than the distance from the tooth to the postpetiole; from above the petiole is from  $1\frac{1}{2}$  to twice as long as broad depending upon the development of the lateral tubercles. Postpetiole from above

pentagonal, distinctly broader than long, with lateral tubercles and median dorsal impression. Gaster strongly carinate on sides. Legs moderately long.

Opaque, reticulate-rugulose, mandibles striate, antennal tips sub-lucid.

Pilosity not abundant for *Apterostigma*, of grayish hairs irregularly directed, most abundant and backwardly directed on gaster; pubescence very sparse. Color varying from dark brown to yellowish-brown, the head being darkest.

Described from nine workers from C. Esperanza, Beni, Bolivia, collected by Dr. W. M. Mann in March, 1922.

This species is close to *wasmanni* Forel but differs chiefly in possessing more irregular frontal lobes, shorter and more triangulate ridges on the mesonotal declivity, longer petiole with a more rounded node, and much paler color. From *wasmanni* ssp. *petiolatum* ssp. nov. it differs in slightly smaller size and in possessing more irregular frontal lobes, shorter and more triangular ridges on the mesonotal declivity, and longer and lower petiole.

#### *Apterostigma mayri* Forel

This species, like many other Attini, varies considerably in size and color. The types of *mayri* are from Trinidad and I have collected this species here from many localities. As a rule, they are smaller and darker than those before me from Costa Rica and Guatemala on the one hand, and from numerous localities in Bolivia on the other hand. Whether these larger and paler variations deserve a name is a problem which cannot be satisfactorily settled without more field information. Possibly they are the form characteristic of the highlands since the type specimens probably came from a low elevation, certainly less than 1,000 feet. Most of my collections are from elevations of more nearly 200 feet. Those which I collected in a number of localities in British Guiana, and which resemble the Trinidad specimens closely, are from elevations of from less than 100 feet to about 400 feet above sea level.

*Apterostigma mayri* Forel *zip*, ssp. nov. (Figs. 13, 16)

Worker. — Length 2.8-3.0 mm., of thorax (including epinotum) 1.2-1.3 mm., of hind femur 1.2 mm. Head, excluding mandibles, 1 1/2 times as long as broad; occiput evenly convex, produced into a short, cylindrical neck with transverse margin; eyes, viewed from in front projecting as hemispheres; anterior

clypeal margin produced as a rounded, obtuse angle; frontal lobes moderate, evenly convex, frontal carinae distinct only for a distance about equal to that of the lobes; antennal scapes exceeding occiput by about twice their distal diameter; mandibles very feebly sinuate on inner margin, their masticatory border feebly concave. Anterior pronotal margin raised in a feeble ridge which is depressed medially; thoracic ridges very feeble; promesotum in profile slightly irregularly convex; junction between basal and declivous surfaces of epinotum feebly indicated by slight angularity. Petiole in profile with node in form of rounded right angle,  $1/2$  longer than high; from above irregularly trapezoidal with converging sides,  $1\frac{1}{2}$  times as long as wide. Postpetiole from above cordate, about  $1/5$  broader than long. First gastric segment feebly carinate on anterior half of sides. Legs of moderate proportions.

Sub-opaque, mandibles finely striate, antennal tips sub-lucid.

Pilosity moderately abundant, especially on gaster, and sub-appressed or reclinate; pubescence sparse.

Color reddish-brown to yellowish-brown.

**Female.** — Length 3.5 mm., of thorax (including epinotum) 1.5 mm., of hind femur 1.3 mm. Similar to the worker except for the usual sexual differences. Epinotal declivity obtusely angulate in profile; petiole in profile with dorsal surface straight in anterior portion and rising in slight angle to angulate apex of node, ventral surface with feeble convexity in middle,  $1\frac{1}{3}$  times longer than high.

**Male.** — Length 3.3 mm., of thorax (including epinotum) 1.4 mm., of hind femur 1.2 mm. — Frontal lobes sub-vertical, reflected posteriorly; anterior margin of clypeus produced as a convex lobe covering basal section of mandibles; mandibles trigonal, not produced into strong apical tooth, masticatory portion edentate, straight; antennal scape distinctly longer than funicular joints 1 and 2 taken together and as long as funicular joints 3 and 4 taken together. Anterior pronotal margin feebly ridged at sides. Epinotum angulate between basal and declivous surfaces, not distinctly dentate. Petiole in profile with evenly convex node and slightly convex ventrum,  $1\frac{1}{2}$  times longer than high. Postpetiole higher than long, convex dorsally and ventrally. Gaster very faintly carinate on sides.

Opaque, vermiculate on head, hairs springing from tubercles.

Pilosity of grayish hairs, most abundant and reclinate on gaster; pubescence sparse.

Head dark brown, thorax lighter brown, rest of body still paler brown, mandibles yellowish brown.

Described from six workers, three winged females and one male from C. Esperanza, Beni, Bolivia, collected by Dr. W. M. Mann in March, 1922.

Five workers and one alate female collected by Dr. Mann at Rio Colorado, Bolivia, September 1921 belong to this form, judging by the edentate epinotum, etc., in the female. Males are unfortunately not present.

From the worker of the typical *mayri* this subspecies differs chiefly in proportions of petiole and in lighter color. The female differs chiefly in larger size and much paler color. The male differs chiefly in larger size, in lacking large, distinct teeth on epinotum, in petiole not being sharply constricted behind, and in paler color.

The color of the typical form is somewhat variable, especially in the worker, but is as a rule very dark. The best characters for separating the two forms are in the petiole of the three castes and in the male epinotum.

*Apterostigma mayri* Forel ssp. *pallidum* Weber

*Apterostigma mayri* Forel var. *pallidum* Weber, 1937, Rev. de Ent. 7:388-399, worker, female.

Worker — Length 2.5-2.8 mm., of thorax (including epinotum) 1.3 mm., of hind femur 1.2 mm. Dorsum of petiole in profile with evenly descending anterior and posterior faces, the apex in form of a round angle, ventrum convex anteriorly.

Female. — Length 3.3 mm., of thorax (including epinotum) 1.3 mm., of hind femur 1.2 mm. Epinotal declivity feebly angulate, not dentate. Dorsum of petiole in profile with feebly convex anterior face and rounded node, ventrum distinctly convex.

This form was originally described as a variety but deserves to rank as a distinct subspecies.

*Apterostigma collare* Emery *dubium*,  
ssp. nov. (Figs. 6, 14, 19)

Worker. — Length 4.3-4.5 mm., of thorax (including epinotum) 1.8 mm., of hind femur 1.8 mm. Frontal lobes produced at sides as approximately right angles, the dorsum

of lobes in front of angles being depressed. Pronotum produced anteriorly as a continuous ridge. Petiole in profile with evenly convex dorsum.

**Female.** — Length 5.3 mm., of thorax (including epinotum) 2.1 mm., of hind femur 2.0 mm. A female of typical *collare* from Hamburg Farm, Sta. Clara Pr., Costa Rica is 4.6 mm. long, thorax 1.7 mm., hind femur 1.8 mm. Other females from this locality are of similar proportions and were taken with workers which compare well with Emery's original description and figure. Frontal lobes as in typical *collare* workers. Neck broad and distinct, with reflexed margin. Anterior pronotal margin produced as a pair of widely separated short and rounded ridges. Petiole in profile with evenly rounded node.

Described from two workers and one dealate female from Barro Colorado Island, Canal Zone, 7.31.24 No. 800, taken by the late Dr. W. M. Wheeler, who gave them to me in 1935. As metatypes may be considered a score of workers in the U. S. N. M. Collection from Parismina Branch, Sta. Clara, Costa Rica, 2.VI.25 (F. Nevermann). According to a pencilled label these were taken «in wood.»

This subspecies differs from the typical form in the following characters: angulate frontal lobes, more continuous ridge on anterior pronotal margin, evenly convex dorsum of petiole, viewed in profile, and in more strongly carinate gaster; in the female the size is larger; the sculpturing deeper, the petiole less angulate dorsally and much higher. The female of this subspecies differs from the female of ssp. *angulatum*, ssp. nov. chiefly in possessing rounded frontal lobes and in higher petiole.

*Apterostigma collare* Emery *angulatum*,  
ssp. nov. (Figs. 4, 12)

**Worker.** — Length 4.3-4.9 mm., of thorax (including epinotum) 1.7-1.9 mm., of hind femur 1.7-1.9 mm. Frontal lobes produced at sides as distinct, approximately right, angles which are somewhat impressed medially. Eyes projecting from sides of head as hemispheres, situated well above the level of the frontal lobes. Neck distinct, with reflexed margin. Anterior pronotal margin in form of entire ridge. Mesonotal and epinotal paired longitudinal ridges moderately high. Petiole in profile with evenly convex dorsum. Gaster strongly carinate on sides.

**Female.** — Length 5.1 mm., of thorax (including epi-



notum) 2.0 mm., of femur 1.9 mm. Frontal lobes angulate as in worker. Neck distinct, with reflexed margin which is concave. Anterior pronotal margin in form of ridge which is thick and complete except for slightly constricted medial portion. Petiole in profile with evenly convex dorsum and plane ventrum. Gaster strongly carinate on sides.

Described from 11 workers and one dealate female from Barro Colorado Island, 6/25/24 (No. 561), 7/22/24 (No. 739) and Ft. Sherman, 7/3/24 (Nos. 595-6), all in the Canal Zone, and taken by Dr. W. M. Wheeler who gave them to me in 1935. Five workers and one dealate female from Hamburg Farm, Sta. Clara Prov., Costa Rica (F. Nevermann, 26.IX.25) in the U. S. N. M. collection belong to this form.

The worker of this subspecies differs from Emery's original description and figure, and from specimens from Costa Rica agreeing closely with the above, in angulate frontal lobes, evenly convex petiole, viewed in profile, in more carinate margins of thorax. The female differs from the female of the typical form from Costa Rica in larger size, angulate frontal lobes, evenly convex petiole, viewed in profile, and in more robust habitus. The female differs from the female of *ssp. dubium*, *ssp. nov.* in having thinner and angulate frontal lobes and in having a lower petiole. The workers of the two subspecies are very similar and would not have been separated were it not for the presence of the females.

*Apterostigma robustum* Emery *tic*, *ssp. nov.* (Fig. 7)

Worker. — Length 4.5-5 mm.; of thorax (including epinotum) 1.8-1.9 mm., of hind femur 1.8-1.9 mm. Head, excluding mandibles and neck, 1.6 times as long as wide; sides parallel, occiput evenly convex and prolonged into a distinct though short neck whose posterior margin is concave and not reflexed; anterior clypeal margin evenly convex, not lobate; eyes strongly convex, at a level distinctly posterior to posterior margin of frontal lobes; frontal lobes slightly raised, strongly convex on outer margin, deeply impressed mesially; antennal scapes 1.1-1.2 mm. long, exceeding occiput by more than their distal diameter; 1st funicular joint as long as 2nd-4th taken together, the latter broader than long; mandibles slender, with feebly sinuate outer margin and straight masticatory border. Thorax, in profile, without conspicuous projections; pronotum anteriorly produced as a pair of rounded lobes; pro-mesonotal region convex, from above with distinct longitudinal paired carinae; epinotum in profile convex, from above

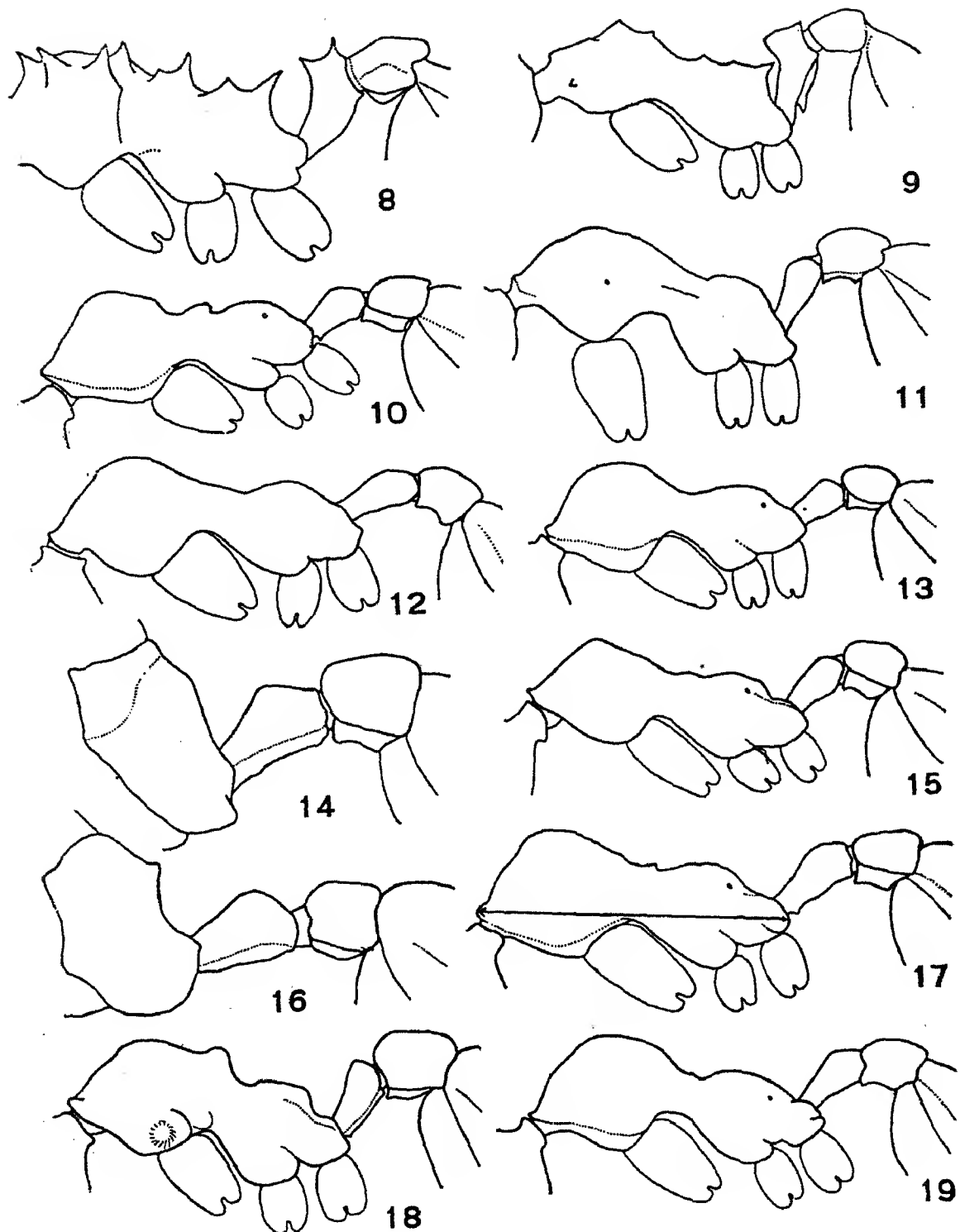


Fig. 8. *Mycocephurus bolivianus* n. sp., worker. — Fig. 9. *Myrmicocrypta tuberculata* n. sp., worker. — Fig. 10. *Apterostigma wasmanni* For. *petiolatum* n. ssp., worker. — Fig. 11. *A. manni* n. sp., worker. — Fig. 12. *A. collare* Em. *angulatum* n. ssp., worker. — Fig. 13. *A. mayri* For. *zip* n. ssp., worker. — Fig. 14. *A. collare* Em. *dubium* n. ssp., epinotum and pedicel of female. — Fig. 15. *A. bolivianum* n. sp., worker. — Fig. 16. *A. mayri* For. *zip* n. ssp., epinotum and pedicel of male. — Fig. 17. *A. billi* n. sp. worker; thorax length indicated by arrows. — Fig. 18. *A. gibbum* n. sp., worker. — Fig. 19. *A. collare* Em. *dubium* n. ssp., worker (Helen Wilson del.)

with much less distinct longitudinal paired carinae, spiracles prominent. Both petiole and postpetiole in profile with rounded dorsa; petiole with nearly plane ventrum produced anteriorly as a slight tubercle; ventrum of postpetiole mesially produced

as concavity terminating anteriorly in acute tooth, posteriorly as rounded obtuse angle. Petiole from above 1.6 as long as wide, triangular with truncate apex, slightly produced outwards in anterior half by lateral spiracles. Postpetiole from above barely wider than long, 1.8 wider than petiole, sides convex and converging anteriorly, posterior margin truncate, impressed mid-dorsally. Gaster from above sub-globose, barely over twice as wide as postpetiole. Legs moderately long and slender.

Subopaque, finely shagreened; mandibles striate; antennal tips sub-lucid.

Pilosity of abundant long grayish hairs which are mostly reclinate to sub-appressed and backwardly directed, and grayish silky pubescence, most abundant on head and gaster.

Reddish brown, tips of appendages paler.

*Female.* — Length 5.2-5.4 mm. of thorax (including epinotum) 2.1 mm., of femur 2.1 mm. Similar to the worker except for the usual sexual differences. Frontal lobes as in worker; eyes larger and their anterior margin extends to a level with the posterior margin of the frontal lobes. Epinotal declivity evenly convex, no tubercles except the spiracular tubercles on epinotum. Petiole from above 1.7 times as long as wide; postpetiole barely wider than long, 1.8 times as wide as petiole. Fore wing 4.9-5.1 mm. long.

*Male.* — Length 4.4 mm. Head from anterior clypeal margin to posterior margin of ocelli 1.4 longer than wide between the eyes; head produced on ventral side of head into a distinct narrow neck with reflexed margin; clypeus strongly convex, covering base of mandibles, the latter edentate except for strong apical tooth; antennal scape and 2nd funicular joint sub-equal in length, the latter longer than any following joints except the terminal joint. Pronotum produced anteriorly as a pair of widely separated gibbosities; mesonotum in profile evenly convex; epinotal declivity somewhat angularly convex. Petiole in profile barely longer than postpetiole. The former with rounded node descending posteriorly in slight concavity and with nearly plane ventrum; the postpetiole flat on top, convex posteriorly. Fore wing 4.2 mm. long.

Pilosity of rather sparse, appressed long grayish hairs and scanty pubescence.

Head and dorsum of thorax dark brown, remainder of body varying from lighter brown to pale yellowish brown on mandibles and tips of antennae.

Described from 30 workers, two being headless, two winged females, one being headless, and one male, all collected by F. Nevermann at Hamburg Farm, Sta. Clara Pr., Costa Rica in 1924 and January 1925 (type locality) and at Guapiles, Costa Rica 4.X.1925. Sexual forms collected at the former locality in 1924. One pin of three workers from Guapiles bears a pencilled label with the inscription «Fungus grower on bromeliad leaves.» A pin of three workers from Hamburg Farm bears the pencilled label «in log.» From the U. S. N. M. collection.

From Emery's original description and drawing of the worker head this subspecies differs in the following characteristics: smaller size, eyes more convex and situated more anteriorly in respect to the frontal lobes, margin of the neck concave instead of transverse, anterior clypeal margin not produced as a lobe, masticatory margin of the mandibles not concave.

*Apterostigma robustum constrictum*, ssp. nov.

Worker. — Length 4.3-5.1 mm., of thorax (including epinotum) 1.7-1.9 mm., of hind femur 1.7-1.9 mm. Head, excluding mandibles,  $1\frac{1}{3}$  times longer than broad in front of eyes, faintly impressed medially at occipital margin, sides parallel, anterior clypeal margin convex, eyes moderately convex, neck short but distinct, with slightly concave margin; frontal lobes thick, with convex outer margins which are deeply reflected down; no distinct frontal carinae; mandibles trigonal with nearly straight outer margin and about a dozen teeth of irregular size, the apical being the larger; antennal scapes thick, incrassate distally, exceeding occipital angles by about their distal diameter; joints 2-9 of funiculus distinctly broader than long. Anterior pronotal margin raised in the form of two convex lobes which are clearly separated. Thorax from above with distinct paired ridges, except in meso-epinotal region, and laterally in front with large but low gibbosities; in profile the ridges on pro-mesonotum are raised anteriorly, thus forming a distinct angle; declivous surface of mesonotum concave; basal surface of epinotum evenly convex. Petiole from above triangular,  $1\frac{1}{3}$  times longer than wide; posteriorly depressed on node; ventrum anteriorly with a very small acute tooth. Postpetiole from above as broad as long with broadly convex sides converging anteriorly, dorsal surface feebly and broadly impressed posteriorly, not quite twice as

broad as petiole. Gaster feebly though distinctly marginate on sides. Legs of moderate proportions.

Opaque, vermiculate-rugulose; mandibles finely striate.

Pilosity of moderately abundant grayish hairs which are mostly sub-appressed, and appressed pubescence.

Ferruginous.

*Female*. — Length 5.4-6 mm., of thorax (including epinotum) 2.2 mm., of hind femur 2 mm. Similar to the worker except for the usual sexual differences. Frontal carinae more clearly indicated than in the worker. Epinotum in profile convex basally and descending in a concavity. Petiole in profile nearly 1 1/2 times as long as high. Gaster faintly marginate on sides.

*Male*. — Length 4.1-4.4 mm., of thorax (including epinotum) 1.7-1.8 mm., of hind femur 1.6-1.7 mm. Anterior clypeal margin evenly convex; frontal lobes large, sub-vertical, evenly convex; mandibles small and weak with concave masticatory portion which is edentate; neck short but distinct and longer than in the worker; antennal scape distinctly longer than any but the terminal funicular joint; second funicular joint distinctly longer than third. Anterior clypeal margin bituberculate with a broad, flat median area. Epinotum angulate to feebly bituberculate. Petiole 1 2/3 times longer than high, triangular in profile and with rounded node, ventrum very feebly sinuate and anteriorly with a minute tooth. Postpetiole slightly longer than petiole and about 1 1/4 times higher. Gaster very faintly carinate.

Opaque, shagreened to irregularly rugulose.

Pilosity moderately abundant, of irregularly curved hairs, mostly reclinate, and sparse, rather long, pubescence which is mostly reclinate.

Dark ferruginous except for browner head and paler appendages.

Described from four males and eight workers from Cavinás Beni (Feb., 1922) and from three alate females and nine workers from Tumupasa (Dec. 1921) all taken by Dr. W. M. Mann in Bolivia. Cavinás Beni designated as type locality. Additional worker specimens (metatypes) are from Covendo (Sept. 1921), Ivon Beni (Feb. 1922), and C. Esperanza, Beni also taken by Dr. Mann in Bolivia.

This subspecies, like the subspecies *tic*, ssp. nov., differs from the typical form in having funicular joints 3-7 distinctly broader than

long, in smaller size, and in other characters. The two subspecies may be readily separated by the shorter neck in all castes of ssp. *constrictum*; the neck is also much more sharply constricted from the head. The gibbositities on the sides of the thorax in the worker and the epinotal angularities in the female and male of ssp. *constrictum*, ssp. nov. are further aids to separation.

*Apterostigma wasmanni* Forel ssp. *petiolatum*, ssp. nov. (Fig. 10)

Worker. — Length 4.5-4.9 mm., of thorax (including epinotum) 2.1-2.2 mm., of hind femur 2.0 mm. Head elongate, excluding mandibles, 1 1/2 times as long as wide between the eyes; occiput prolonged into distinct neck without reflexed border but with lateral impressions causing slight convexities on sides when viewed from above, anterior clypeal margin truncate; mandibles slender with sinuate outer margin and straight masticatory border; eyes, viewed from in front, hemispherical; frontal groove marked posteriorly by distinct carinae in front of eyes and back of frontal lobes with carinae extending to occiput; frontal lobes rounded, depressed anteriorly and posteriorly; antennal scapes moderately incrassate distally, exceeding occiput by over twice their diameters. Anterior pronotal margin produced as a pair of erect tubercles or dentations; fairly distinct lateral ridges of thorax meeting on dorsum anteriorly; paired dorsal longitudinal ridges on thorax and epinotum high and continuous except where interrupted on mesonotal declivity and in meso-epinotal impression; in side view the thorax thus appears high and angular in promesonotal region, with long tubercle on declivity and with epinotal basal face smoothly rounding into declivity. Petiole with distinct antero-ventral tooth, in profile with angular node and plane ventrum, as high as long from ventral tooth to postpetiole; viewed from above triangular, posteriorly produced on sides into distinct tubercles so that the petiole is barely longer than wide posteriorly. Postpetiole from above 1.3 times broader than long because of lateral ridges. Gaster strongly carinate on sides.

Opaque, finely and shallowly reticulate-rugose, mandibles striate, antennal tips sub-lucid.

Pilosity of grayish hairs most abundant on head and gaster, relatively sparse on thorax; pubescence sparse.

Brown; thorax, gaster and appendages dark yellowish brown.

Male. — Length 4.6-4.7 mm., of thorax (including epinotum) 1.9 mm., of hind femur 1.7 mm. Neck distinct, with concave margin. Frontal lobes rounded, subvertical; anterior clypeal margin truncate, not covering entire base of mandibles; mandibles slender, edentate, their masticatory margins not meeting except at apices when mandibles closed. Declivous surface of epinotum convex, not tuberculate. Petiole with distinct antero-ventral tooth, in profile with irregularly angulate node which is as high as the distance from ventral tooth to postpetiole. Fore wing 4.3 mm. long.

Irregularly rugulose.

Head dark brown, rest of body and appendages much lighter brown.

Described from 10 workers and two males collected by Dr. W. M. Mann at Ivon Beni, Bolivia, Febr. 1922. One worker from Huachi Beni, Bolivia, also collected by Dr. Mann, is very similar except for darker color and more opaque surface. It might be considered a slight variant.

This subspecies is larger than the typical form, has a higher petiolar node (the node in the typical form is distinctly longer from ventral tooth to postpetiole than it is high), is less coarsely sculptured and is much paler in color. The male differs from the male of the typical form in its larger size, less angular petiole, well developed petiolar ventral tooth and paler color.

Though the female of this subspecies is not known, it must be much larger than the female of the subspecies *icta* Weber recently described from Trinidad.

*Apterostigma manni*, sp. nov. (Fig. 11)

Worker. — Length 2.6-2.9 mm., of thorax (incl. epinotum) 1.1-1.2 mm., of hind femur 0.9-1.0 mm. Head, excluding mandibles, 1.3 times longer than wide, occipital margin convex, slightly impressed medially, anterior clypeal margin evenly convex; neck reduced to a very short collar about 0.5 mm. long and with a transverse margin; eyes moderately convex, situated distinctly back of mid-line of head; frontal carinae and lobes much as in *mayri* Forel; scrobes bordered laterally by feeble reticulations in front of eyes; antennal scapes sinuate, exceeding occipital margin by nearly twice their distal diameters; funicular joints 2-5 broader than long. Anterior pronotal margin distinctly carinate but lowered medially; promesonotal region with lateral swellings suggesting irregular and rounded ridges. Thorax and epinotum with distinct paired

longitudinal ridges, of variable height, which meet anteriorly and are interrupted in meso-epinotal region. Anterior declivous portion of thorax in profile with a distinct concavity, posterior declivous portion slightly angulate; meso-epinotal region broadly depressed. Epinotal declivity in profile with distinct concavity. Petiole from above nearly twice as long as wide at posterior margin; spiracles at sides produced as distinct tubercles; in profile the petiole is anteriorly convex above and below, the node is distinct and convex, forming a concavity with the stem of the petiole behind; ventrally with a distinct tooth. Postpetiole from above about  $1 \frac{1}{5}$  wider than long, with convex sides converging to the truncate anterior margin; posteriorly impressed but not as distinctly as in *mayri*; ventral surface produced as a sharp concavity. Gaster sharply carinate on sides.

Sculpturing coarse, the body covered with distinct pilose tubercles which have a tendency to fuse together to form short vermiculations. Integument sub-lucid to dull between sculpturing.

Pilosity comparatively scanty, of reclinate to sub-appressed grayish hairs which are more upright on thorax and pedicel. Pubescence scanty.

Color yellowish-brown.

Described from several score workers taken by Dr. W. M. Mann in December, 1921 at Tumupasa, Bolivia.

This species is similar to *mayri* Forel in size and general habitus but differs in coarse sculpturing, proportions of pedicel, in paler color, etc. From *calverti* Wheeler it differs in having the gaster strongly carinate, in paler color, and in other characters. The species *steigeri* Santschi is described as 3.5 mm. long and without a neck. Two additional species of similar size are *ierense* Weber and *dorotheae* Weber both of which are much darker and with very different thoraces.

With several pins of workers were a male *Crematogaster* and three minute males of *Cyphomyrmex*.

*Apterostigma fusinodum*, sp. nov.

Worker. — Length 3.4-3.7 mm., of thorax (including epinotum) 1.5-1.6 mm., of hind femur 1.5-1.6 mm. Head, excluding mandibles,  $1 \frac{1}{3}$  times longer than wide in front of eyes; occipital margin evenly rounded, gradually constricted behind into a distinct neck; sides feebly convex; eyes convex, situated distinctly above the frontal lobes; anterior clypeal margin evenly convex; frontal lobes small, with convex outer



margin which is feebly sinuate anteriorly; frontal carinae moderately distinct and extending level with the posterior margin of eyes; antennal scapes exceeding occipital corners by over  $1/3$  of their length; 2nd funicular joint about as broad as long, 3rd-7th longer than broad; mandibles with sinuate outer margin and about 15 teeth which are progressively smaller basally. Paired longitudinal carinae of thorax and epinotum very faintly indicated; thorax in profile without angularities; basal and declivous surfaces of epinotum forming an even convexity. Petiole fusiform in profile, from above variably somewhat over  $1 \frac{2}{3}$  times longer than wide posteriorly, antero-ventrally with a minute tooth. Postpetiole twice as wide as petiole, sides convex, posterior margin feebly emarginate and produced as indistinct gibbosities on each side; postero-ventrally with a ridge appearing as a tooth in profile. Gaster faintly carinate on sides. Legs moderately long and slender.

Sub-lucid, finely granulose, mandibles finely striate-punctate.

Pilosity of abundant long, flexuous hairs which are mostly sub-appressed, and a fine, appressed pubescence.

Moderately dark ferruginous, the head darker.

Female (dealate). — Length 3.7-4 mm., of thorax (including epinotum) 1.63 mm., of hind femur 1.5-1.6 mm. Similar to the worker except for the usual sexual differences. The epinotum bears two short, rounded tubercles. Petiole with an anterior ventral tooth, in profile somewhat fusiform as in worker but more angulate at apex of node, from above slightly over  $1 \frac{2}{3}$  times longer than broad, Postpetiole from above  $1 \frac{3}{4}$  times broader than petiole, slightly less than  $1 \frac{1}{3}$  times broader than long; produced postero-ventrally as a ridge which appears in profile as a tooth. Gaster indistinctly carinate on sides.

Male. — Length 3.6 mm., of thorax (including epinotum) 1.68 mm., of hind femur 1.54 mm. Occipital margin convex gradually constricted behind into a short neck, anterior clypeal margin evenly convex, frontal lobes sub-erect, auriculate, mandibles trigonal, edentate, funicular joints 2 and 3 taken together  $1 \frac{1}{7}$  times longer than scape. Epinotum with distinct, rounded, paired tubercles as in female. Petiole with minute antero-ventral tooth, somewhat fusiform in profile but with dorsal (nodal) convexity much greater than the feeble ventral convexity. Postpetiole in profile with nearly

flat dorsal surface rounded at each end and on the ventral margin posteriorly with a large, rounded tooth. Gaster feebly carinate on sides. Legs moderately long and slender.

Inequalities of surface lucid, otherwise opaque and finely granulose, mandibles finely and densely striate-punctate.

With moderately abundant long, flexuous hairs which are mostly appressed, and a fine appressed pubescence which is most abundant on gaster and appendages.

Head and thorax fuscous, rest of body ferruginous, mandibles brownish yellow.

Described from 32 workers, two dealate females and two males taken by Dr. W. M. Mann at Tumupasa, Bolivia, Dec. 1921 (type locality) and from a series of workers and females (metatypes) taken by Dr. Mann at C. Esperanza, Beni, Sta. Helena and at Covendo, Bolivia. A typical worker from Sta. Helena is 3.8 mm. long, the thorax (including epinotum) 1.5 mm., and the hind femur 1.55 mm. long while a female has the corresponding measurements of 4.17 mm., 1.72 mm. and 1.6 mm. Another female is much larger, being 4.7 mm., 1.82 mm. and 1.78 mm. respectively.

This species, resembling a large *mayri* Forel in general habitus except for more slender build, is characterized chiefly by the fusiform petiole in the worker and, to a lesser extent, in the male and female. It is probably near *A. pilosum* Mayr but this species is described as having funicular joints 2-7 not longer than broad. The single female (dealate) from Covendo has the measurements of 4.1 mm., 1.9 mm., and 1.77 mm., respectively. This may represent a slight dimorphism in the female or it may merely illustrate normal variation. That the former may be the case is suggested by the constancy of the worker size.

*Apterostigma madidiense*, sp. nov.

Worker. — Length 3.1-3.2 mm., of thorax (including epinotum) 1.4-1.5 mm., of hind femur 1.35 mm. Head, excluding mandibles, about 1.4 times as long as broad, occipital margin smoothly convex, corners rounded-angulate; head constricted sharply behind into a short but distinct neck with feebly expanded margin; sides sub-parallel, eyes moderately convex and situated at a level distinctly above the frontal lobes; anterior clypeal margin convex, mandibles with sinuate outer margins and about a dozen small teeth, frontal lobes moderate, with convex outer margins which are feebly sinuate anteriorly, frontal carinae distinct to a level just posterior to eyes, antennal scapes exceeding occipital margin by a length equal

to nearly twice their distal diameter; 2nd funicular joint about as broad as long, 3rd-9th distinctly broader than long. Meso- and epinotal carinae much reduced, thorax in side view without angularities; anterior pronotal margin reflected as two slight but distinct lobes. Petiole  $1 \frac{2}{3}$  as broad as long,  $\frac{3}{4}$  as high as postpetiole, node rounded above, ventral margin slightly convex, without tooth. Postpetiole about  $\frac{1}{5}$  broader than long and  $1 \frac{2}{3}$  times broader than petiole, sides evenly convex. Gaster slightly carinate on sides. Legs moderately long and slender.

Opaque, finely granulose, mandibles finely striate-punctate.

Pilosity of abundant, fine, flexuous yellowish hairs and a fine pubescence.

Ferruginous, head darker.

Female (alate). — Length 3.8 mm., of thorax (including epinotum) 1.65 mm., of hind femur 1.47 mm., of fore wing 3.4 mm. Similar to the worker except for the usual sexual differences. Anterior clypeal margin produced in the middle as a slight but distinct obtuse angle. Epinotum in profile without tubercles but gibbous. Petiole, as in worker, without antero-ventral tooth. Gaster slightly carinate on sides.

Male. — Length 3.6-4.1 mm., of thorax (including epinotum) 1.45-1.7 mm., of hind femur 1.4-1.52 mm., Occipital margin of head feebly impressed in middle, anterior clypeal margin evenly convex, mandibles edentate with slightly concave masticatory margin, frontal lobes inclined, with reflexed margin; antennal scape distinctly longer than funicular joints 2 and 3 taken together, head sharply constricted behind into a distinct neck. Epinotal tubercles rounded, directed upwards, declivity feebly convex. Petiole without ventral tooth but with a gibbosity in its place, mid-ventrally feebly convex, only slightly lower than the postpetiole. Gaster faintly carinate on sides.

Opaque, finely granulose, head sparsely and irregularly rugulose; thorax more coarsely and abundantly vermiculate-rugulose.

Pilosity of moderately abundant flexuous hairs and a somewhat coarse pubescence.

Head and thorax dark brown, gaster paler, appendages, especially mandibles, yellowish-brown.

Described from two collections amounting to 15 workers, 5 males, and one alate female taken by Dr. W. M. Mann on the Lower Rio Madidi, Bolivia, Jan. 1922. One collection was from «under bark on tree,» the other «beneath palm fronds.» A series of workers, one alate female and a number of males from Ivon Beni, Bolivia collected by Dr. Mann in Jan. 1922 may be considered metatypes.

This species resembles a large *mayri* Forel. It is smaller than *pilosum* Mayr and with funicular joints 3-9 distinctly broader than long.

*Apterostigma bolivianum*, sp. nov. (Fig. 15)

Worker. Length 3.9-4 mm., of thorax (including epinotum) 1.6-1.7 mm., of hind femur 1.7-1.8. Head, excluding mandibles, nearly 1 1/2 times as long as wide back of eyes, sides subparallel with strongly convex eyes not appreciably impressing them, anterior clypeal margin convex but not produced so that when mandibles are closed the basal part is not covered by the clypeus, occipital corners evenly rounded, occiput feebly impressed medially, back of head gradually constricted into a long neck (0.3 mm. long) whose posterior margin is expanded; frontal carinae feebly developed and short, frontal lobes thick, with outer margins convex, except for an anterior impression, and reflected; outer margins of mandibles distinctly sinuate, masticatory margin with fine, regular teeth; antennal scapes long and slender, exceeding occiput by about half their length; all funicular joints except 7-9 distinctly longer than broad, the latter as broad to broader than long. Anterior pronotal margin produced as ridge which is distinctly depressed medially; thorax with distinct subparallel ridges of even height; meso-epinotal impression very broad and concave except for distinct median tubercles which represent continuations of the paired ridges to the epinotum, ridges on the latter distinct and feebly diverging. Petiole from above about 1 2/3 times as long as broad, viewed laterally the dorsum rises smoothly to a rounded node, the ventrum is slightly convex in the middle and lacks a tooth. Postpetiole 1 4/5 wider than the petiole, about 1.1 times wider than long, sides convex, converging anteriorly. Gaster sharply carinate on sides. Legs moderately long.

Sub-lucid, shagreened to finely and irregularly tuberculate and rugulose.

Pilosity sparse, of appressed to reclinate grayish hairs, and appressed pubescence.

Pale ferruginous, gaster, antennal funiculi, and fore part of head darker (the workers may have not attained complete adult coloration).

Female. — Length 4.3 mm., of thorax (including epinotum) 1.9 mm., of hind femur 1.7 mm. Similar to the worker except for the usual sexual differences. Neck long as in the worker, anterior pronotal margin raised in form of two vertical lobes separated by a narrow diastema. Epinotum with a pair of distinct tubercles which are directed upwards and slightly backwards. Postpetiole 1.7 times broader than petiole and 1.2 wider than long. Gaster sharply carinate on sides.

Opaque, finely shagreened.

Dark ferruginous, appendages somewhat paler.

Described from 5 workers and one dealate female from Tumupasa, Bolivia taken by Dr. W. M. Mann, Dec. 1921.

This species has longer funicular joints and a longer neck than *pilosum*. In general habitus it resembles *wasmanni* and its subspecies here described but has a longer neck and a different arrangement of the thoracic ridges.

*Sericomyrmex beniensis*, sp. nov.

Worker. — Length 3.4-3.7 mm., of thorax (including epinotum) 1.5 mm. Head, excluding mandibles, 1.1 times broader than long, occipital margin deeply incised, the halves of the margin convex, occipital corners evenly rounded, sides evenly convex; eyes feebly convex, situated at a distance from the clypeus about equal to their diameter; anterior clypeal margin slightly extended, truncate, antennal scrobes distinct bordered by frontal carinae extending nearly to occipital corners and by pre-orbital carinae which extend to a level with the posterior margin of eyes; frontal lobes feeble, with sinuate anterior margin and rounded-angulate behind; mandibles 7-dentate, their outer margin sinuate; antennal scapes failing to reach the occipital angles by a distance equal to between 1 and 2 times their distal diameters. Pronotum anteromedially with a distinct though low, gibbosity and laterally with low, blunt tubercles; mesonotum with much higher acute tubercles or low spines, in front of which extends a transverse groove; declivous of mesonotum with distinct, blunt tubercles or teeth; basal surface of epinotum with posteriorly diverging

paired carinae which terminate in distinct rounded teeth. Both petiole and postpetiole from above with strong lateral carinae which end posterior to middle as distinct teeth; petiole, including lateral teeth, broader than long, feebly bituberculate above; postpetiole, including lateral teeth, distinctly broader than long and  $1\frac{1}{3}$ - $1\frac{1}{2}$  times broader than petiole. Gaster feebly impressed medially, distinctly carinate on sides. Legs moderately long.

Opaque, finely granulose. Mandibles smooth and shining except for a few fine striations at margins.

Pilosity of abundant, curved, subappressed to reclinate hairs and fine, silky pubescence.

Ferruginous-red.

Described from a score of workers taken by Dr. W. M. Mann at Huachi Beni, Bolivia, August, 1921.

This species is close to *saussurei* Emery of Brazil but judging from Emery's and W. M. Wheeler's descriptions the mesonotal spines are lower, the basal carinae of the epinotum less distinct and the mandibles only feebly striate at the margins. It is distinctly smaller than *bierigi* Santschi of Panama.

*Cyphomyrmex (Cyphomannia)*, subgen. nov.

Worker. General habitus of *Cyphomyrmex*. Size small. Head broadest behind and expanded at the occipital angles into lamellate spines, the lamellae being continuous with the frontal carinae above and the postorbital carinae below; occipital margin concave. Anterior clypeal margin fringed by a lamella which is continuous with the frontal lobes. Frontal lobes large, extending well beyond lateral margins of head. Antennal scrobes complete. Mandibles 5-dentate. Thorax and epinotum forming a convex dorsal surface without spines or tubercles and interrupted only by a distinct meso-epinotal groove. Pronotum dorso-laterally with a curved, low ridge; inferior angles rounded, lamellate. Basal and declivous surfaces of epinotum inseparable. Petiole and postpetiole contracted. Dorsal surface of node of petiole several times broader than long. Postpetiole fitting in closely between petiole and gaster, much broader than long, rounded above. Gaster without distinct carinae or impressions. First gastric segment overarch-ing remainder. Legs short; femora curved, basally thickened and lamellate at the inferior angle; tibiae thickened, angular; tarsi small, cylindrical. Opaque, finely granulose. Mandibles

striate-punctate. Pilosity sparse, of short, appressed golden hairs. Color brown.

Subgenotype: *Cyphomyrmex* (*Cyphomannia*) *laevigatus* sp. nov.

This subgenus is striking and readily distinguished by the large frontal lobes, lamellate occipital spines, smoothly curved thorax and epinotum without tubercles or spines, and by the compressed petiole and postpetiole. It is different in these respects from all known *Cyphomyrmex*. No information is available on the kind of fungus garden developed by these ants, whether like *C. rimosus* or the more typical Attine type of *C. bigibbosus* and the others.

*Cyphomyrmex* (*Cyphomannia*) *laevigatus*, sp.  
nov. (Figs. 20-21)

Worker. — Length 2.3-2.4 mm., of thorax (including epinotum) 1.1 mm. Head strongly narrowed anteriorly; occipital margin concave with a broad but distinct median notch; occipital angles auriculate; sides of head and eyes not visible, viewed anteriorly, when the antennae are folded because of them and the frontal lobes; eyes moderately convex, margined below by a carina which extends irregularly to form part of auriculate occipital angles, in front of the eyes curves a short carina to the mandibular insertions; frontal lobes very large and flat with convex outer margin contracting suddenly posteriorly above the antennal insertions, frontal carina extends from lobes to occipital angles; anterior clypeal margin lamellate, transverse in middle, raised laterally to frontal lobes, thus forming a continuous margin except for small irregularities; antennal scapes extending to apices of occipital angles, markedly contracted near base; funicular joints 2-8 broader than long; mandibles with convex outer margin and broad masticatory margin bearing 5 teeth of which the basal is irregularly developed and arises close to the 4th. Thorax and epinotum forming dorsally one convex arch broken only by the meso-epinotal groove, margined anteriorly by a curved rounded ridge as in *Cyphomyrmex bigibbosus* Emery; inferior pronotal spine blunt and flattened or lamellate. Petiole seen from above bears a small peduncle, node  $2\frac{2}{3}$  times broader than long, sides rounded and converging anteriorly. Postpetiole, from above, about 1.6 times broader than petiole and about 1.6 times broader than long, sides straight, converging anteriorly, posterior margin slightly impressed at sides and medially. 1st gastric segment distinctly longer than

broad, sides feebly convex posteriorly, more convex posteriorly. Legs short with femora bowed basally and with a lamella forming the inferior margin. tibiae massive, angular, tarsi slender.

Opaque, finely and evenly granulose, mandibles densely striate-punctate.

Pilosity of scattered, appressed, short, golden hairs; antennal funiculi and tarsi with short pubescence.

Dull yellowish-brown, head and dorsum of thorax darker.

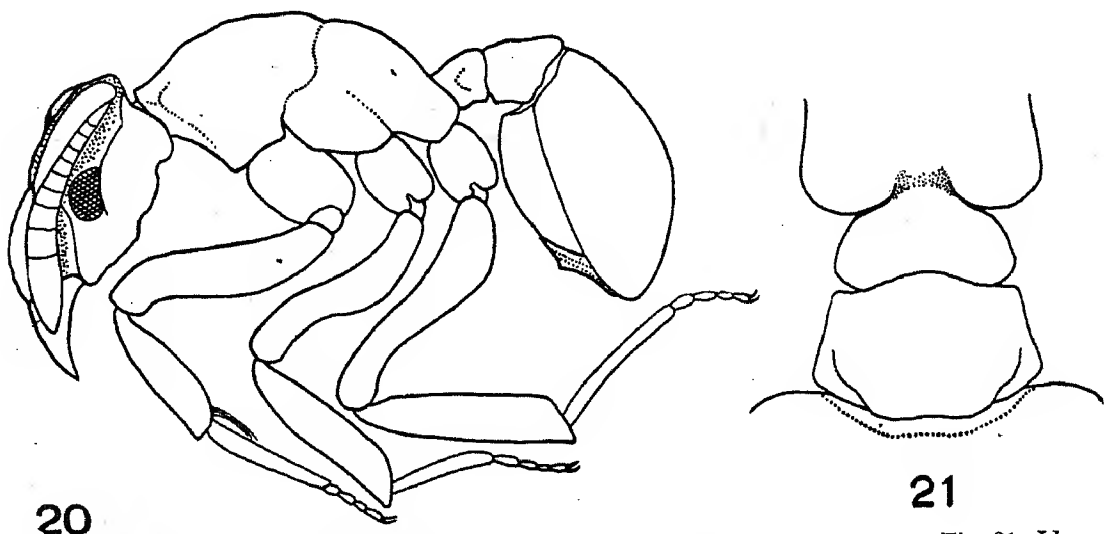


Fig. 20. *Cyphomyrmex* (*Cyphomannia* n. subg.) *laevigatus* n. sp., worker. — Fig. 21. *Idem*, pedicel from above. (Helen Wilson del.)

Described from 12 workers taken by Dr. W. M. Mann on the Lower Rio Madidi, Bolivia, Jan. 1922.

This aberrant species is unlike any known. *C. bruchi* Santschi and certain forms of *C. rimosus* Spinola have reduced spinulation or tuberculation of the thorax but in these the head and pedicel are of the normal *Cyphomyrmex* type; in none is the thoracic sculpturing so completely absent.

*Cyphomyrmex bigibbosus* Emery *tumulus*, n. ssp.

Worker. — Length 2.1-2.2 mm., of thorax (including epinotum) 0.92-1.0 mm. Differing from topotypes of the typical form chiefly in smaller size, in having much lower and more evenly rounded occipital tubercles, and higher median pronotal and posterior mesonotal tubercles. Differing from two cotypes of the var. *faunulus* Wheeler in the Museum of Comparative Zoology chiefly in having shorter and more rounded occipital tubercles, distinct, though small clypeal teeth



which are generally rounded, higher median pronotal and posterior mesonotal tubercles, more rounded petiolar dorsum, and in darker color. Petiolar node from above slightly longer than broad with sides diverging a little *anteriorly* and rounded in front. Postpetiole  $1\frac{1}{2}$  times wider than petiole, distinctly longer than wide, deeply emarginate in middle posteriorly so that a distinct tubercle is left on each side. Gaster without distinct impressions or ridges except for a feeble lunate impression across the anterior part facing the postpetiole. Head, thorax and gaster are uniformly dull gray and with the appendages only slightly lighter with a brownish tinge.

*Female*. — Length about 2.6 mm., of thorax (including epinotum) 1.1-1.2 mm. Differing from the holotype female of *jaunulus* in having shorter and less acute occipital tubercles, frontal lobes anteriorly less evenly convex, more abundant and coarser hairs of head, scutellar spines shorter, petiole lower, dorsal median impression of postpetiole deeper, and in darker color. Node of petiole distinctly longer than broad. Postpetiole  $1\frac{1}{2}$  times broader than petiole, slightly longer than broad, deeply and broadly emarginate on dorsal posterior margin leaving a strong tubercle on each side. Gaster with a deep Y-shaped impression anteriorly with the prongs directed toward the postpetiole.

*Male*. — Length 2.3-2.5 mm., of thorax (including epinotum) 1.0 mm. Head in front view pentagonal with occipital angles produced as acutely pointed spines; eyes in front view projecting as two hemispheres occupying  $\frac{1}{3}$  the lateral margins of head; mandibles well-developed,  $\frac{1}{3}$  total length of head, the two apical teeth large and acute, the 3-4 teeth on the masticatory part tiny in comparison. Thorax in profile with plane pronotum, gently convex scutum of mesonotum, and scutellum produced backwards and upwards as a conspicuous rounded cone; seen from above each lateral margin of the scutum anterior to the Mayrian furrow bears a low, blunt tubercle, posterior to the furrow a sharp, high carina; Mayrian furrow broad and deep; each mesoparapтерon (praescutellum) dorsolaterally bears a small, distinct tubercle; scutellum produced backwards and upwards in two acute teeth which are as long as the distance between their bases; epinotum irregularly and gently convex. Petiole in profile nearly  $\frac{1}{3}$  longer than postpetiole, dorsal surface with small convexity anterior to highest, median, convexity. Postpetiole evenly con-

vex dorsally, highest posteriorly. Gaster ovate. Legs long and slender.

Described from colonies taken by myself near the Forest Settlement, Mazaruni River, British Guiana, Aug. 25-26, Sept. 2, 1935 (type locality) and from one worker and one dealate female taken by myself by the Oronoque River of the Courantyne basin, towards the opposite end of British Guiana, July 22, 1936 (metatypes).

I have taken the typical *bigibbosus* in the latter locality several times but not near the coast. The var. *faunulus* occurs in the vicinity of *tumulus* and seems to occupy similar ecological situations.

*Cyphomyrmex bigibbosus* Emery *petiolatus*, n. ssp.

Worker. — Length 2.4-2.6 mm., of thorax (including epinotum) 1.04 mm. Distinguished from the typical form chiefly by the broader petiole and postpetiole and by paler color. Occipital tubercles well developed, inclined at apices slightly forward and concave; antennal scapes extending to the ends of these concavities. Anterior clypeal margin somewhat truncate, feebly emarginate medially. Mandibles distinctly 6-toothed with a 7th tooth variably developed, densely striate-punctate. Pronotum with a faint medial gibbosity; metanotum with a pair of high, conical tubercles; declivous surface with paired gibbosities of variable development as in the typical form, sides of thorax in front of metanotal tubercles with a distinct ridge extending to anterior margin; inferior (humeral) spine of pronotum small and rounded. Petiole in profile with nearly straight dorsal and ventral surfaces, from above rectangular, distinctly broader than long. Postpetiole massive, distinctly broader than long, feebly impressed mid-dorsally, feebly emarginate behind with a slight gibbosity on either side.

Yellowish-brown, head and dorsal surface of gaster darker.

Female (dealate). — Length 3.5 mm., of thorax (including epinotum) 1.4 mm. Easily distinguished from the female of the typical form by the shape of the petiole. Seen from above, instead of being rectangular and slightly longer than broad as in the typical form, the petiole excluding a constricted peduncle, is about  $1 \frac{1}{7}$  times broader than long with the sides expanded in front into two lobes. The postpetiole is slightly over  $1 \frac{1}{4}$  times wider than the petiole and is about  $1 \frac{2}{5}$  times broader than long with a mid-dorsal

impression extending over the anterior surface. Gaster with a more shallow Y-shaped impression than in the typical form.

Brown, without the grayish pruinosity and the darker cast of the typical form.

Described from one dealate female and eight workers taken by Dr. W. M. Mann on the Lower Rio Madidi, Bolivia, Jan. 1922. As metatypes may be considered two dealate females from Rio Madidi, three workers from the Lower Rio Madidi and a dealate female from Cavinass, all in Bolivia taken by Dr. Mann.

The workers of this subspecies are unsatisfactorily separated from the typical form unless with the characteristically shaped female.

*Cyphomyrmex rimosus* Spinola *venezuelensis*,  
ssp. nov.

Worker. — Length 1.7-1.8 mm., of thorax (including epinotum) 0.86 mm. Frontal and postorbital carinae somewhat produced over occipital angles so the latter are slightly extended but not tuberculate, occipital margin gently concave; postorbital tubercle reduced to slight gibbosity; sides of head convex; antennal scapes exceeding occipital angles by their distal diameter; mandibles 5-toothed. Median pair of pronotal tubercles reduced to slight gibbosities, lateral pronotal tubercles distinct, rounded-conic; the four mesonotal tubercles reduced to low, massive gibbosities; meso-epinotal impression deep and sharp; epinotum with two pair of low tubercles or gibbosities. Petiole about  $1 \frac{4}{5}$  broader than long. Postpetiole about  $1 \frac{2}{5}$  broader than petiole and slightly over  $1 \frac{1}{2}$  broader than long, with subparallel sides rounded in front and broadly impressed dorsum. Gaster anteromedially impressed above, faintly carinate on sides.

Head and gaster moderately dark brown, remainder paler.

Described from a colony of workers taken by myself a few miles downstream from Ciudad Bolivar beside the Orinoco River, Venezuela, Jan. 30, 1935. The colony was under an old log on the edge of the beach just above high-water level. Brood was separate from the fungus garden, the latter being developed on animal excrement.

This subspecies is near *C. rimosus dentatus* Forel. The workers differ from cotypes of *dentatus* in the Museum of Comparative Zoology in having longer antennal scapes, the mesonotal dorsum not margined anteriorly by as distinct an ellipse, the epinotal teeth much

reduced, the petiole not as broad and more rectangular than hexagonal when viewed from above, the postpetiolar sides less sharply angular and in much darker color.

*Cyphomyrmex rimosus* Spinola *trinitatis*, ssp. nov.

Worker. — Length 1.7-1.8 mm., of thorax (including epinotum) 0.84-0.88 mm. Occipital corners without tubercles, merely carinate from the projection of the postorbital and frontal carinae backwards; occipital margin broadly concave; postorbital tubercle distinct; frontal lobes large, outer margin convex. Median pronotal tubercles distinct, lateral tubercles more massive; the four mesonotal tubercles distinct, the declivity from the posterior pair to the meso-epinotal impression deep and acute; basal surface of epinotum bicarinate, of variable development; in profile the declivous surface is marked above by a gibbosity and lower down by a second gibbosity. Petiole slightly less than  $2\frac{1}{2}$  times as broad as long. Postpetiole about 1.2 broader than petiole, about  $1\frac{1}{3}$  broader than long, trapezoidal with rounded anterior corners and emarginate posteriorly. Gaster feebly carinate on sides. Dark brown.

Female. — Length 2.2 mm., of thorax (including epinotum) 1.0 mm., of fore wing 2.6 mm. Similar to the worker except for the usual sexual differences. Postorbital tubercle less distinct than in worker. Paired lateral pronotal tubercles rounded-conic, massive. Epinotal spines distinct, short, rounded at apex. Gaster with a small, deep impression antero-medially above; feebly carinate on sides. Moderately dark brown, appendages paler.

Described from one colony taken by myself on the summit of El Tucuché (3072 feet), Northern Range, Trinidad, B. W. I., Dec. 16, 1934. The ants were under a piece of wood on the grassy mountain top which was frequently bathed in clouds.

The workers of this subspecies are close to *C. rimosus salvini* Forel but differ from cotypes in the Museum of Comparative Zoology in smaller size, in having pro- and anterior meso-notal spines lower, epinotal ridges higher, occipital tubercles lower, gastric hairs sparser and color darker. They also resemble *C. rimosus minutus flavescens* Wheeler cotypes in general habitus but the posterior mesonotal tubercles are much more distinct and higher, the meso-epinotal impression more acute, the size larger and the color darker. It may be closer to *C. rimosus fuscus* Emery which, according to Santschi's figures, is rather variable.

*Cyphomyrmex rimosus* Spinola *hamulatus*, n. ssp.

Worker. — Length 1.8-1.9 mm., of thorax (including epinotum) 0.84-0.87 mm. Median and lateral pronotal tubercles distinct; anterior and posterior mesonotal tubercles somewhat higher than the pronoto-lateral tubercles and more acute. Basal surface of epinotum slightly carinate on each side. This subspecies is strikingly characterized by having short, simple hooked hairs instead of clavate or squamate hairs. These hairs are produced on distinct tubercles on the gaster. Ferruginous, head and gaster infuscated.

Described from a few workers taken by Dr. W. M. Mann at C. Esperanza, Beni (March, 1922).

*Cyphomyrmex rimosus* Spinola *curiapensis*, n. ssp.

Worker. — Length 2.-2.2 mm., of thorax (including epinotum) 1.0 mm. Occipital corners produced as acute angles; post-orbital tubercles distinct; mandibles 5-dentate, the teeth widely spaced; antennal scapes exceeding occipital corners by over their distal diameter. Median pronotal tubercles low but distinct, lateral pronotal tubercles massive, rounded-conic; anterior mesonotal tubercles large and massive, connected by a transverse raised semicircle in front which is further delimited by numerous flattened hairs, posterior mesonotal tubercles low and massive, meso-epinotal impression deep. Basal surface of epinotum feebly bicarinate; terminating at each end in somewhat more distinct gibbosities. Petiole about twice as broad as wide. Postpetiole about  $1\frac{1}{4}$  broader than petiole, similarly broader than wide, rounded in front with slight notch which continues backward into a broad median dorsal impression. Gaster with a longitudinal median impression antero-dorsally, faintly carinate on sides. Brown, head and gaster darker.

Female (alate). — Length 2.5 mm., of thorax (including epinotum) 1.12 mm., of fore wing 3.1 mm. Similar to the worker except for the usual sexual differences. Occipital corners prolonged into distinct tubercles; postorbital tubercles distinct; anterior clypeal margin truncate; antennal scapes exceeding occipital angles by their distal diameters. Lateral pronotal tubercles high, rounded at apices; epinotal well-developed, rounded at apices, the declivous surface beneath in profile concave. Gaster as in worker.

Male. — Length 2.4 mm., of thorax (including epinotum) 1.16 mm., of fore wing 3.0 mm. Occipital tubercles in the form of compressed spines; anterior clypeal margin truncate, distinctly notched medially; mandibles 3-dentate, the basal portion of masticatory border edentate, densely punctate. Pronotum with a spine on each side. Epinotal teeth distinct. Postpetiole not quite  $1\frac{1}{2}$  times broader than petiole and distinctly less than  $1\frac{1}{2}$  times as broad as long, broadly impressed dorsally, posterior border concave. Sculpturing basally densely reticulate, partly obscured on head and thorax by irregular rugulosity. Fuscous, appendages and gaster more brown.

Described from one colony of all castes taken by myself Feb. 7, 1935 on the Isla Curiapo in the Orinoco Delta, Venezuela. The nest was in humus about the roots of an epiphyte on a tree trunk at an elevation of six feet. Three to four feet below this nest in the trunk of the tree was a nest of *Acromyrmex octospinosus* Reich.

This subspecies is close to *C. rimosus salvini* Forel but differs from cotypes of the latter in the Museum of Comparative Zoology as follows: occipital angles lower, groove inferior to occipital angles present, mesonotal tubercles lower and more rounded, meso-epinotal impression less obtuse, epinotal tubercles more distinct, more pronounced antero-median dorsal impression on gaster, hairs more numerous and slightly narrower.

*Trachymyrmex echinus*, sp. nov. (Fig. 3)

Worker. — Length 2.7 mm., of thorax (including epinotum) 1.16 mm. Head excluding mandibles, slightly broader between apices of orbital tubercles than long between clypeal margin and apices of occipital spines, occipital margin straight except for broad median notch, occipital spines massive but short, tuberculate, inferior occipital spine longer than the dorsal spine, tuberculate, pre-occipital spines short but distinct, eyes moderately convex, situated dorso-laterally at a distance from the clypeus equal to their diameters and bordered on ventral margin by a tuberculate swelling, anterior clypeal margin lobate, broadly and deeply notched medially, frontal groove completely bordered by the pre-orbital and frontal carinae which extend to the occipital spines, frontal lobes angulate on outer margin, mandibles sinuate on outer margin, long and slender, about 9-dentate, the basal teeth irregularly reduced, antennal scapes exceeding occipital spines by a distance

equal to their distal diameter, all funicular joints broader than long. Median pronotal tubercles large and borne on a common gibbosity, anterior lateral spines large, slender, acute, median lateral spines distinctly lower but more massive at the base, third pair of lateral spines still lower, bifurcate on the right side, more slender and single on the left side, declivous surface with a tubercle on each side, basal surface of epinotum tuberculate, not markedly convex, epinotal spines longer than thoracic spines, slender, directed backwards and somewhat upwards, distinctly diverging. Petiole, excluding the short peduncle, distinctly broader than long, with four tubercles on dorsum and several on sides of which the medial one is high and acute. Postpetiole about  $1\frac{1}{2}$  times broader than petiole, about as broad as wide, with median dorsal impression which is bounded by anteriorly converging carinae on sides. Gaster carinate on sides, median impression feeble. Legs moderately long and slender.

Opaque, finely granulose, mandibles finely striate-punctate, with numerous coarse, setigerous tubercles which on the gaster become partially connected by fine carinae at their bases.

Pilosity of coarse, short hooked hairs on tubercles, longer and upright hairs chiefly on head and gaster, and a fine pubescence on appendages.

Dark ferruginous.

Holotype: one worker taken by Dr. W. M. Mann at Rosario (L. Rocagua), Bolivia, Nov. 1921.

This species resembles *T. phaleratus* Wheeler of British Guiana but is smaller, darker, has higher median thoracic spines, and is in other ways different.

*Trachymyrmex levis*, sp. nov.

Worker. — Length 2-2.1 mm.; of thorax (including epinotum) 1.0 mm. Head, excluding mandibles, slightly longer than broad, occipital margin broadly and shallowly impressed, sides convex, converging anteriorly, eyes moderately convex, situated about  $1\frac{1}{2}$  times their diameter from the clypeus; occipital corners rounded, multituberculate dorsally, with inferior angles more coarsely tuberculate but without distinct spines; anterior clypeal margin slightly convex, distinctly notched medially; frontal lobes with evenly convex lateral margins, frontal carinae extending to occipital angles but feebly develop-

ed posteriorly, preorbital carinae extending only slightly farther than posterior margin of eyes; anterior clypeal margin convex, shallowly notched in middle; mandibles with sinuate outer margin, about 9-dentate, the basal teeth becoming small and rudimentary; antennal scapes surpassing occipital corners by a distance equal to slightly more than their distal diameter; all funicular joints longer than broad. Anterior lateral pronotal spines low, truncate, surmounted by 3 or 4 tubercles; between these spines occur, in the middle, two pairs of closely-set tubercles enclosing a trapezoidal area which is wider anteriorly; between this median set and the lateral spines occur on each side a single tubercle of variable height; second pair of thoracic spines similarly reduced to low, truncate gibbosities bearing about 5 tubercles; third pair of spines similarly reduced, with two or three tubercles; mesothoracic declivity with a distinct tubercle on each side; basal surface of epinotum anteriorly with one strong tubercle on each side and, in some specimens, a smaller tubercle; epinotal spines small and acute, not greatly larger than the anterior epinotal tubercles. Petiolar node from above not quite  $1\frac{1}{2}$  times broader than long, with two dorsal tubercles. Postpetiole 1.8 times broader than petiole, slightly broader than long, broadly impressed medially, posterior angles not markedly produced as gibbosities, nor margin medially impressed. Gaster distinctly carinate on sides, feebly impressed antero-medially. Legs moderately long and slender.

Opaque, finely granulose, mandibles finely striate, frons of head with a few longitudinal rugosities; setigerous tubercles most numerous on rear of head and on gaster.

Pilosity of short, hooked, yellow hairs on tubercles and a sparse pubescence most obvious on appendages. Slightly pruinose, with scattered powdery aggregations, chiefly on head and thorax.

Pale ferruginous.

Described from a dozen workers taken by Dr. W. M. Mann at Tumupasa, Bolivia, Dec. 1921. A single damaged worker from C. Esperanza, Beni, Bolivia taken by Dr. Mann in March, 1922 seems to belong to this species.

This species belongs to the group of small species including *T. irmgardae*, *bugnioni*, *abortivus*, *humilis*, *tucuché*, sp. nov., and *schomburgki*, sp. nov., which are separated chiefly on the bases of differences in spinosity and proportions of the pedicel.



*Trachymyrmex mandibularis*, sp. nov.

Worker. — Length 3.4-3.6 mm., of thorax (including epinotum) 1.5 mm. Head, excluding mandibles, distinctly broader than long, occipital margin deeply incised, occipital corners rounded and multituberculate with a short but acute inferior spine, sides convex, converging anteriorly, eyes moderately convex, situated a distance equal to their diameters from the clypeus, anterior clypeal margin feebly lobate and shallowly notched medially, frontal lobes extended laterally in the form of acutely angulate lobes, frontal carinae not reaching occiput; between frontal carinae posteriorly extend a pair of short, outwardly curved carinae from the mid-occiput; preorbital carinae start in the form of a distinct tooth midway between eye and clypeus and extend in an inward curve to a level with the vertex; mandibles massive for *Trachymyrmex*, with convex outer margin with two distinct apical teeth and an irregular series of 6-8 denticles of variable development; antennal scapes slender, extending a distance equal to about twice their distal diameters beyond occiput; all funicular joints distinctly longer than broad. Pronotum with a pair of high, acute median tubercles or small spines which are more or less bifurcated; inferior pronotal spine somewhat flattened and backwardly directed; median spines about twice as high as the other thoracic spines, the anterior lateral pair (pronotal) lower than the most posterior pair, all spines variably tuberculate, declivous surface of mesothorax with an acute tubercle on each side; basal surface of epinotum convex and with two or three pairs of tubercles which are of variable development and position, epinotal spines long, acute, very slender, curved upwards towards tips. Petiole, excluding a short pedicel, about  $1 \frac{1}{3}$  times longer than wide and with two high, acute tubercles dorsally; postpetiole slightly longer than broad and  $1 \frac{2}{3}$  broader than petiole, concave above with a row of tubercles converging anteriorly on either side, posteriorly produced at each angle as raised, tuberculate gibbosities. Gaster carinate on sides, medially impressed. Legs long and slender.

Sub-lucid, finely granulose, mandibles finely striate, with coarse, setigerous tubercles most numerous on back of head and on gaster, where widely spaced.

Pilosity of hooked hairs on tubercles and fine pubescence on appendages.

Pale ferruginous with an infuscated blotch on vertex of head.

**Female** (dealate). — Length 5 mm., of thorax (including epinotum) 2.2 mm. Similar to the worker with the usual sexual differences. The mandibles are similarly massive. Body distinctly rugulose-vermiculate. Lateral pronotal spines low, massive, bituberculate, inferior spines slightly flattened and recurved; epinotal spines 0.36 mm. long, stout, curved backwards slightly; postpetiole  $1\frac{3}{4}$  times broader than petiole and about 1.3 times broader than long. Dark ferruginous with infuscated ocellar region.

Described from one dealate female and 22 workers taken by Dr. W. M. Mann at Blancaflor, Beni, Bolivia, Jan. 1922 (type colony) and from 12 workers taken by Dr. Mann at Rurrenabaque, Beni, Bolivia in Oct. 1921. The latter specimens differ slightly in darker color.

This species resembles *Acromyrmex* in general habitus but the workers before me are monomorphic and the female is of *Trachymyrmex* size. In thoracic spinulation it resembles *T. isthmicus* Santschi from Panama but the spinulation of the head and pedicel is different, the frontal lobes, proportions of pedicel, and color different. The mandibles of this species are unusually massive and are outstandingly characteristic.

*Trachymyrmex schomburgki*. sp. nov.

**Worker**. — Length 2 mm., of thorax (including epinotum) 0.9 mm. Head, excluding mandibles, slightly longer than broad; eyes situated in front half of head, posterior margin not quite reaching mid-line; sides convex, occipital margin broadly and fairly deeply impressed, occipital corners rounded, with a number of sharp tubercles; ventro-lateral part of occipital angles bearing a stout, acute tooth or large tubercle; anterior clypeal margin gently convex, distinctly notched in middle; frontal lobes small, lateral margin convex, frontal carinae extending to corners of head; mandibles trigonal with feebly sinuate outer margin and masticatory portion edentate except for an apical and a preapical tooth, the basal part with an irregular border suggesting worn or rudimentary teeth; antennal scapes exceeding corners of head by nearly twice their distal diameters, distal 2 joints (9-10) of funiculus taken together distinctly shorter than remainder of funicular joints and longer than joints 2-8 taken together.

Pronotum above with four distinct tubercles arranged in

a transverse row between the lateral spines in place of the customary median pair of tubercles, the lateral (anterior) spines very low, tri-tuberculate, the next posterior (anterior mesonotal) spines also very low, reduced to more gibbosities, and bearing fine tubercles of variable height, gibbosities corresponding to the 3rd pair of thoracic spines bear three tubercles of which the antero-lateral is much the largest; declivous surface of mesonotum on each side with a small tubercle; meso-epinotal impression evenly concave; basal surface of epinotum anteriorly with strong tubercles on each side, epinotal spines small but distinct and acute. Node of petiole from above broader than long, bearing two large, acute, and diverging tubercles above and two tubercles on each side. Postpetiole  $1 \frac{7}{10}$  wider than petiole, slightly broader than long, median dorsal impression feebly, posterior margin not distinctly prolonged on each side in gibbosities. Gaster distinctly carinate on sides. Legs of moderate proportions.

Opaque, granulose; mandibles striate, frons of head sparsely and irregularly rugulose, body, especially on posterior part of head, on postpetiole and on gaster with coarse setigerous tubercles.

Pilosity sparse, of coarse, recurved hairs on tubercles.

Ferruginous, head somewhat darker.

Holotype: one worker taken by myself in the vicinity of the Forest Settlement, Mazaruni River, British Guiana, August 14, 1935.

This species, compared with *abortivus* Wheeler taken in the same region, has the occipital border not straight but decidedly emarginate, a distinct spine on the occipital angles, the mandibles not 9-toothed but edentate on the masticatory portion, a row of 4 pronotal tubercles instead of 2 medial feeble elevations, a pair of large tubercles on the petiole instead of scattered minute tubercles, a narrower postpetiole and has a carinate gaster. It is smaller than *T. tucuché* sp. nov. or *T. humilis* and differs from these species in many characters.

It is dedicated to Sir Richard Schomburgk, pioneer naturalist-explorer of British Guiana.

*Trachymyrmex jamaicensis* André *antiguensis*,  
ssp. nov.

Worker. — Length 3-3.5 mm., of thorax (including epinotum) 1.4-1.6 mm. Differing from topotypes of *jamaicensis* in the Museum of Comparative Zoology of Harvard in having

higher and stouter posterior occipital spines, higher and slenderer pronotal spines, plane instead of gently convex dorsum of epinotum, and in grayish pruinosity. It is distinctly smaller and with less coarse spines than the var. *frontalis* Santschi, which also lacks the pruinosity. Tubercles and spines of a *haytiana* Wheeler and Mann cotype are distinctly coarser, the size is larger and the pruinosity absent. Cotypes of *cubaensis* Wheeler are larger, the anterior occipital spine higher, the anterior (median) mesonotal spine larger, stouter, and more coarsely tuberculate, the paired tubercles of the petiole higher, and the gaster more coarsely tuberculate.

Described from a dozen workers taken on Long Island, Antigua, British West Indies, May 7, 1936 by Mr. H. E. Box who sent them to me with the note «mound nest on ground.» This collection represents the first collection of *Trachymyrmex* in the Leeward Islands. The ants are closer to the *cubaensis* cotypes than to the *frontalis* or *haytiana* workers, both of Haiti, or the typical form from Jamaica.

*Trachymyrmex urichi* Forel *radicis*, ssp. nov.

Worker. Length 2.3-2.7 mm., of thorax (including epinotum) 1.24 mm. Differing from the typical *urichi* chiefly in having the median pronotal spine reduced to a bituberculate gibbosity, the second lateral pair of thoracic spines less massive, lower, and more slender, the petiole tuberculate on dorsum instead of smoothly convex and in smaller size.

Described from four workers, one headless, taken Nov. 25, 1934 on Point Radix, separating Cocos and Mayaro Bays, Trinidad, B. W. I., by myself.

*Trachymyrmex tucuché*, sp. nov.

Worker. — Length about 2.4 mm., of thorax (including epinotum) 1.04 mm. Head, excluding mandibles, distinctly longer than wide in front of eyes, occipital margin gently emarginate, angles rounded without outstanding spines but only with a few small tubercles, eyes moderately convex, situated well in front of middle of head, anterior clypeal margin gently convex except for a distinct median notch, frontal lobes small, convex, frontal carinae carried nearly to occipital angles, antennal scapes exceeding occipital angles by less than their distal diameter, mandibles trigonal with feebly sinuate outer margin, masticatory portion with about

7 irregular teeth but basal portion much worn so that teeth are much reduced. Thorax without large, outstanding spines; pronotum anteriorly with a low median pair of bituberculate spines between larger, more tuberculate lateral spines, highest part of thorax with massive tuberculate gibbosities, declivous surface of mesothorax above with a pair of the highest thoracic spines, between which are two tubercles, and below which are two additional but much smaller spines. Basal surface of epinotum anteriorly with massive tuberculate spines, posteriorly with much less massive tuberculate spines. Node of petiole from above slightly broader than long, tuberculate on sides and dorsally. Postpetiole from above nearly twice as broad as petiole, distinctly broader than long, sparsely tuberculate on sides, shallowly impressed dorsally, produced posteriorly at sides as slight gibbosities but not sharply emarginate medially. Gaster not carinate on sides. Legs of moderate proportions.

Opaque, granulose, mandibles striate, head medially distinctly rugulose longitudinally, body with sparse but coarse setigerous tuberculations, especially on gaster where they are evenly spaced and not confluent.

Pilosity confined to the curved hairs of tubercles, the appendicular hairs and sparse pubescence.

Dull ferruginous, head with faint darker blotches on frons and between frontal lobes.

Described from two damaged workers taken by myself on the densely forested steep slopes of El Tucuché, second highest peak of the Northern Range, Trinidad, B. W. I., Dec. 15, 1934. The ants had formed a turret entrance to the nest which was below an overhanging cliff.

As metatypes may be considered a worker taken by myself in the Arena Forest Preserve, near San Rafael, Dec. 12, 1934 and a worker which I took in the foothills north of Tunapuna, July 12, 1935, both in Trinidad, B. W. I. In both workers the apical teeth of the right mandible are broken off and the teeth of the left mandible are intact.

This species with *T. humilis* Wheeler and *T. abortivus* Wheeler are very close and might be considered forms of a single species. It differs from cotypes of the former and the holotype of *abortivus* chiefly in having slightly shorter antennal scapes, more sharply tuberculate occipital region, less distinct rugulosities on head, higher tubercles on thorax, in having two pairs of spines on declivous surface of mesonotum (feeble tubercles in the other species), two tuberculate spines on base of epinotum (2 or 3 low tubercles in the

other species), smaller and less inflated postpetiole, and more tuberculate and dorsally flat postpetiole in profile (convex dorsally in profile and produced slightly anteriorly in the others, especially in *humilis*).

*Trachymyrmex trifurcatus*, sp. nov.

Worker. — Length 3.7 mm., of thorax (including epinotum) 1.52 mm. Head, excluding mandibles, as broad as long, occipital margin sloping inward slightly to distinct medial notch, sides converging anteriorly, eyes moderately convex, outer margin extending only slightly beyond sides posteriorly, situated in front of head at a distance of  $1\frac{1}{2}$  their length from the clypeus; lateral post-orbital spine lacking, indicated by slight gibbosity; occipital corners with a pair of low dorsal and ventral tuberculate spines with concavity between; ventro-lateral margin of head posteriorly with two low, blunt tuberculate spines; frontal lobes large, with convex outer margin except for a distinct notch in front of middle, antennal scrobes bordered by complete carinae above and below; mandibles sinuate on outer margin, teeth reduced to about 9 blunt and irregular tubercles; anterior clypeal margin slightly convex, distinctly notched in middle; antennal scapes extending to occipital angles; second funicular joint as broad or broader than long, remainder of joints clearly longer than broad. Median pronotal spine reduced to a gibbosity bearing 4 somewhat confluent tubercles; two small tubercles in a row extend from the median spine to the anterior lateral spines, these latter much less massive than the 2nd pair of lateral thoracic spines and slightly lower; carinae extend from the 1st pair to the anterior pronotal margin; 2nd pair of lateral spines multi-tuberculate; 3rd pair of lateral spines conspicuously tri-furcate, the forks in the form of high, acute and slender teeth; declivous surface of thorax with a single high tubercle on the right side, a bifurcated tubercle on the left; basal of epinotum in front with a pair of distinct tubercles followed on the right side by a tubercle midway to the epinotal spines, the latter high, slender and acute. Petiole from above distinctly broader than long, tuberculate dorsally. Postpetiole less than twice as broad as petiole, less than  $1\frac{1}{3}$  times broader than long, feebly impressed dorsally. Gaster moderately carinate on sides. Legs moderately long and slender.

Opaque, granulose, frons of head faintly, sparsely and irregularly rugulose; mandibles feebly striate; body with

numerous coarse setigerous tubercles; abundant on the posterior part of head and scapes, somewhat sparse but coarse on gaster.

Pilosity of hooked hairs on tubercles and a fine pubescence most abundant on antennal funiculi and legs. Slightly pruinose.

Dark red-brown.

Holotype: one worker taken by myself a few miles east of the Oko River, tributary of the Cuyuni River, British Guiana, June 29, 1936.

This species is close to *T. urichi* Forel. It differs from syntypes of *urichi* chiefly in the reduction of the post-orbital and the inferior occipital spines, the coarser tubercles of the head and body in general, the trifurcate 3rd pair of thoracic spines, the shorter epinotal spines, and in darker color. It is named from the conspicuous trifurcate 3rd pair of thoracic spines.

*Acromyrmex* (*Moellerius*) *balzani* Emery *pampanus*, ssp. nov.

Worker. — Length 3-7 mm. Worker maxima: Antennal scapes slightly exceeding occipital corners, the latter bearing a few low and variable tubercles of which only 4-6 are distinct; occipital spine short and acutely pointed; mandibles stout with an acute apical tooth and an irregular series of denticles. Median pronotal tubercles of variable height but distinct, lateral pronotal tubercles of somewhat greater height, also variable, and more massive, inferior pronotal spines flattened, recurved; anterior pair of mesonotal spines much larger than any other spines of body, slender apically; posterior mesonotal pair variable in development, in some reduced to the size of the pronotal tubercles, in others distinct but small spines. Basal surface of epinotum raised anteriorly as a slightly tuberculate carina on each side, posteriorly terminating in high, slender, acute, sub-vertical spines. Petiole above with a pair of acute tubercles. Gaster coarsely tuberculate, the tubercles spaced so that a median and a lateral longitudinal area above are largely smooth.

Sculpturing feeble, the head rugulose only between the frontal carinae and sparsely in the antennal scrobes; mandibles coarsely striate; thorax faintly and sparsely rugulose; gaster shagreened.

Female (headless). — Probable length about 8 mm., of thorax (including epinotum) 3.3 mm. Lateral pronotal tubercles short, broad at base, acutely pointed, inferior spine slender, somewhat flattened, directed obliquely backwards.

Epinotal spines slender, rounded at apices, bent backwards at bases. Petiole above with a pair of acute tubercles connected by carinae which continue laterally to the posterior margin. Postpetiole above in front with a pair of higher tubercles and near posterior margin with a lower pair. Gaster coarsely tuberculate, slightly concave on sides anteriorly, and without tubercles; on each side of a broad, median non-tuberculate area occur towards anterior margin two clumps of tubercles. Legs long and slender.

Thorax dorsally with high sharp longitudinal carinae converging somewhat backwards. Median longitudinal non-tuberculate area of gaster with distinct transverse rugulosities anteriorly, which become vermiculate medially, and posteriorly become short rugulosities parallel to the long axis of the body. Gastric tubercles with rugulosities extending from their bases. Light ferruginous.

Male. — Length 8 mm., of thorax (including epinotum) 3.3 mm. Clypeal margin produced in front and with a sharp, elliptical emargination medially; occipital angles marked by short, acute, tuberculate ridges. Pronotum laterally with a short, irregular carina on each side in place of distinct tubercles, inferior spine short, slender, acute, and flattened basally. Epinotal spines much shorter than in female, but slender and blunt apically. Pedicel feebly tuberculate above. Gaster largely smooth but with a few rounded, setigerous gibbosities in place of tubercles.

Head distinctly rugulose, the rugulosities mostly converging to the ocelli. Thorax above finely rugulose longitudinally with distinct punctulations between. Gaster sub-lucid but microscopically reticulate.

Hairs sparse, mostly coarse and sub-erect except on gaster where recurved.

Brown, almost black on head and thorax, appendages lighter brown.

Described from a series of workers, one headless female and one male from Rosario (L. Rocagua) (Nov. 1921) and a series of workers from Reyes (October 1921), Bolivia, all taken by Dr. W. M. Mann. Two males from San Gregorio, Bolivia taken by Dr. Mann are similar to the Rosario male but differ slightly in sculpturing, etc. They may tentatively be considered this subspecies until the other castes become known. Dr. Mann writes that Reyes is in genuine pampas



country. This subspecies thus resembles the ssp. *planorum* Weber of the Venezuelan llanos and the ssp. *myersi* Weber of the British Guiana savannahs in habitat.

The worker of this subspecies differs from a cotype of *balzani* Emery kindly sent me by Dr. Carlo Menozzi chiefly in having distinctly longer anterior mesonotal spines, more acutely tuberculate petiole above, and more densely and coarsely tuberculate gaster which lacks the fine rugulosities of the cotype. It differs from the ssp. *myersi* Weber and *planorum* Weber chiefly in smaller size, more distinctly tuberculate occipital region, shorter posterior mesonotal spines and in comparatively more coarsely tuberculate gaster. According to Santschi's 1925 key the var. *senex* Santschi is more rugose and the occipital tubercles are better developed; the var. *multituber* Santschi has many more occipital tubercles.

#### Part V. The Attini of Bolivia

1. *Mycocepurus bolivianus*, sp. nov. — Worker, Rurrenabaque, Beni (W. M. Mann) (Type locality).
2. *Mycocepurus manni*, sp. nov. — Female, San Gregorio (W. M. Mann) (Type locality).
3. *Myrmicocrypta rudiscapus* Emery 1913, Ann. Soc. Ent. Belg. 57: 253-254, Figs. 2d, 3c, 4. — Female, Mapiri (no collector) (Type locality).
4. *Myrmicocrypta* sp. Emery 1913, Ann. Soc. Ent. Belg. 57: 254-255, Fig. 6. — Male, Mapiri (no collector) (Type locality).
5. *Myrmicocrypta foreli* Mann ssp. *surianensis* Wheeler 1925 Arkiv För Zool. 17: 45. — Worker, Suriani (N. Holmgren) (Type locality).
6. *Myrmicocrypta tuberculata*, sp. nov. — Worker, Ixiamas (W. M. Mann) (Type locality).
7. *Myrmicocrypta occipitalis*, sp. nov. — Worker, male, Tumupasa (W. M. Mann) (Type locality).
8. *Myrmicocrypta boliviana*, sp. nov. — Worker, Rurrenabaque, Beni (W. M. Mann) (Type locality).
9. *Apterostigma gibbum*, sp. nov. — Worker, female, male, C. Esperanza, Beni (W. M. Mann) (Type locality).
10. *Apterostigma belli*, sp. nov. — Worker, C. Esperanza, Beni (W. M. Mann) (Type locality).
11. *Apterostigma mayri* Forel. — Worker, female, male, Espia Rio Bopi, Blancaflor, Covendo, Ivon Beni, Huachi Beni, Sta. Helena, Lower Rio Madidi, Tumupasa, Rio Negro, Canamina (W. M. Mann).

12. *Apterostigma mayri* Forel *zip*, ssp. nov. — Worker, female, male, C. Esperanza, Beni (Type locality), worker, female, Rio Colorado (W. M. Mann).
13. *Apterostigma robustum* Emery *constrictum*, ssp. nov. — Worker, male, Cavinás Beni (Type locality), worker, female, Tumupasa, worker, Covendo, Beni, C. Esperanza (W. M. Mann).
14. *Apterostigma wasmanni* Forel *petiolatum*, ssp. nov. — Worker, male, Ivon Beni (Type locality), worker, Huachi Beni (W. M. Mann).
15. *Apterostigma manni*, sp. nov. — Worker, Tumupasa (W. M. Mann) (Type locality).
16. *Apterostigma fusinodum*, sp. nov. — Worker, female, male, Tumupasa (Type locality), Worker, female, C. Esperanza, Beni, Sta. Helena, Covendo (W. M. Mann).
17. *Apterostigma madidiense*, sp. nov. — Worker, female, male, Lower Rio Madidi (Type locality), Ivon Beni (W. M. Mann).
18. *Apterostigma bolivianum*, sp. nov. — Worker, female, Tumupasa (W. M. Mann) (Type locality).
19. *Apterostigma urichi* Forel, — Worker, Ivon Beni (W. M. Mann).
20. *Sericomyrmex beniensis*, sp. nov. — Worker, Huachi Beni (W. M. Mann) (Type locality).
21. *Cyphomyrmex rimosus* Spinola. — Wheeler 1925, Arkiv För Zool. 17: 45, Worker, female, male, Charubamba, Mojos (N. Holmgren). Ants belonging to this species were collected by Dr. W. M. Mann in the following Bolivian localities: Canamina, C. Esperanza, S. Helena, Tumupasa, Ivon Beni, Huachi Beni, Espia Rio Bopi, Rosario (L. Rocagua), Rio Negro, San Antonio, Isiamas, and Rurrenabaque. Several subspecies are included. These will be separated in a projected revision.
22. *Cyphomyrmex rimosus* Spinola ssp. *hamulatus*, ssp. nov. — Worker, C. Esperanza, Beni (W. M. Mann).
23. *Cyphomyrmex bigibbosus* Emery. — Worker, Covendo, Huachi Beni, Lower Rio Madidi, Cachuela Esperanza, worker, female, Ivon Beni, female, Riberalta (W. M. Mann).
24. *Cyphomyrmex bigibbosus* Emery *petiolatus*, ssp. nov. — Worker, female, Lower Rio Madidi (Type locality), female, Cavinás (W. M. Mann).

204 Weber, Biology of the fungus-growing ants. Parts IV-V.

25. *Cyphomyrmex* (*Cyphomannia*) *laevigatus*, subgen. et sp. nov. — Worker, Lower Rio Madidi (W. M. Mann) (Type locality).
26. *Trachymyrmex holmgreni* Wheeler 1925, Arkiv För Zool. 17: 37-38. — Worker, Mojos (N. Holmgren) (Type locality).
27. *Trachymyrmex echinus*, sp. nov. — Worker, Rosario (L. Rocagua), (W. M. Mann) (Type locality).
28. *Trachymyrmex levis*, sp. nov. — Worker, Tumupasa, (Type locality). C. Esperanza, Beni (W. M. Mann).
29. *Trachymyrmex mandibularis*, sp. nov. — Worker, female, Blancaflor, Beni (Type locality), Rurrenabaque, Beni (W. M. Mann).
30. *Acromyrmex subterraneus* Forel 1893, Ann. Soc. Ent. Belg. 87: 593. — Worker, female. Bolivia.
31. *Acromyrmex subterraneus* Forel v. *purensis* (Forel). — Santschi 1925, Rev. Suisse Zool. 31: 372, 395, Worker. Bolivia (Balzan).
32. *Acromyrmex laticeps* Emery 1905, Mem. Acad. Sc. Bologna 2: 109-110, 118, Figs. 16, 17. — Worker, female, male. Bolivia.
33. *Acromyrmex laticeps* Emery ssp. *nigrosetosus* (Forel). — Santschi 1925, Rev. Suisse Zool. 31, Worker, Bolivian Chaco. A few workers taken by Dr. Mann at Ixiamas run to this form in Santschi's 1925 key.
34. *Acromyrmex lundii* Guérin ssp. *boliviensis* Emery 1905, Mem. Acad. Sc. Bologna 2: 109-110, 119, 121. — Worker, male, Bolivia (Type locality). Series of workers taken by Dr. Mann at Cajuata and Suri belong to this small form.
35. *Acromyrmex coronatus* Fabr. — Long series of workers taken by Dr. Mann at Rurrenabaque, Lower Rio Madidi, Blancaflor, Beni, Espia Rio Bopi, Huachi Beni, Tumupasa, and a single worker from Reyes run to this species in Santschi's key.
36. *Acromyrmex coronatus* Fabr. ssp. *andicola* Emery. — A few media workers from Rio Colorado and one from Sta. Helena (W. M. Mann) agree well with descriptions of the typical form from Ecuador and *andicola* v. *globoculis* Forel workers from British Guiana.

37. *Acromyrmex hispidus* Santschi 1925, Rev. Suisse Zool. 31: 376, 396. — Worker, Conradite (Lizer et Delétang) (Type locality).
38. *Acromyrmex aspersus* Smith. — A series of workers from Rosario (L. Rocagua), Tumupasa and Espia Rio Bopi (W. M. Mann) run to this species in Santschi's key. More than one form is evidently represented but more material is needed.
39. *Acromyrmex (Moellerius) balzani* Emery ssp. *multituber* Santschi, 1922, Bull. Soc. Vaud. Sc. Nat. 54: 362, Worker; 1925, Rev. Suisse Zool. 31: 387, 389, Chemin de Aroyo Negro (Lizer et Delétang). (Type locality).
40. *Acromyrmex (Moellerius) balzani* Emery *pampanus*, ssp. nov. — Worker, female, male, Rosario (L. Rocagua) (Type locality), Worker, Reyes (W. M. Mann).
41. *Atta cephalotes* L. — Specimens collected by Dr. W. M. Mann at Huachi Beni, Ivon Beni and Tumupasa are referable to this species. Pending a revision of this variable species they are listed under the typical form.
42. *Atta cephalotes* v. *opaca* Forel. — Santschi 1929, Wiener Ent. Zeit. 46: 92, Worker Bolivia.
43. *Atta polita* Emery 1922, Genera Insectorum, p. 353. — Bolivia: Mapiri.
44. *Atta polita* Emery v. *lizeri* Santschi 1922, Bull. Soc. Vaud. Sc. Nat. 54: 364. — Worker. Bolivia: Santa Cruz de la Sierra (Lizer et Delétang) (Type locality).
45. *Atta columbica* Guér. — Emery, 1913, Ann. Soc. Ent. Belg. 57: 260. Bolivia.
46. *Ata sexdens* L. v. *rubropilosa* Forel. — Wheeler 1925, Arkiv För Zool. 17: 36, Worker, Mojos, Tuiche (N. Holmgren). Workers, dealate females, and a male from Rurrenabaque and workers from Cavinás Beni (W. M. Mann) are referable to this form.
47. *Atta sexdens* v. *fuscata* Santschi 1922, Bull. Soc. Vaud. Sc. Nat. 54: 362-363. — Worker. Bolivia: Quarayos et entre Aroyo Negro et Trinidad (Lizer et Delétang) (Type localities).
48. *Atta vollenweideri* Forel, Wheeler 1925, Arkiv För Zool. 17: 36. — Worker. Bolivia: Charubamba (N. Holmgren).

A dealate female in the U. S. N. M. collection from Montevideo, Uruguay (A. Felippone) belongs to this species.

49. *Atta laevigata* F. Smith, — Soldiers and workers collected by Dr. Mann at Reyes, in pampas country, correspond closely to those taken by myself on the llanos of Venezuela and determined as *laevigata* by W. M. Wheeler.

## Miscellanea Carabidologica Americana. Pars II.

VON MAX LIEBKE, Hamburg

(Mit 11 Figuren)

### *Lebia tremolerasi*, n. sp.

Einfarbig schwarz, glänzend, mit Ausnahme des Halsschildes und der Vorderbrust; der erstere ist blutrot gefärbt, hat dabei einen sehr schmalen schwarzen Seitenrand und einen keilförmigen Fleck in der Mitte, am Hals breit beginnend und an der Basis spitz endigend. Ausserdem sind die 3 1/2 Basalglieder der Fühler rot gefärbt.

Kopf mit wenig vorragenden Augen, Seiten hinter denselben leicht gerundet allmählich verengt. Kopfschild scharf längsgefurcht, auf der Stirn einen spitzen Keil freilassend; Grund netzmaschig gerunzelt. Halsschild etwas breiter als der Kopf, etwa die Hälfte breiter als lang; Seiten vorn schmal, hinten breiter abgeflacht, gerundet erweitert, zur Basis leicht verengt, vor derselben sehr flach ausgeschweift. Mittellinie leicht eingedrückt, Scheibe scharf wellenförmig gerunzelt, im Grunde netzmaschig gerunzelt. Flügeldecken ziemlich kurz, Seiten leicht gerundet erweitert, Spitze leicht schräg abgestutzt, Spitzenrand leicht S-förmig geschwungen, Aussenwinkel deutlich betont. Punktstreifen eingekerbt, zur Spitze zu flacher werdend, Zwischenräume dementsprechend gewölbt. Viertes Glied der Hintertarsen bis zur Mitte ausgeschnitten, Seitenlappen zugespitzt. Länge 4 mm.

Ein Stück aus Misiones, Argentinien, in meiner Sammlung. Ich benenne es dem verstorbenen Kollegen Juan Tremoleras zu Ehren, welcher mir dies Stück auch überliess.

Gruppe *L. analis* Dej., hier durch die Zeichnung des Halsschildes recht auffallend.